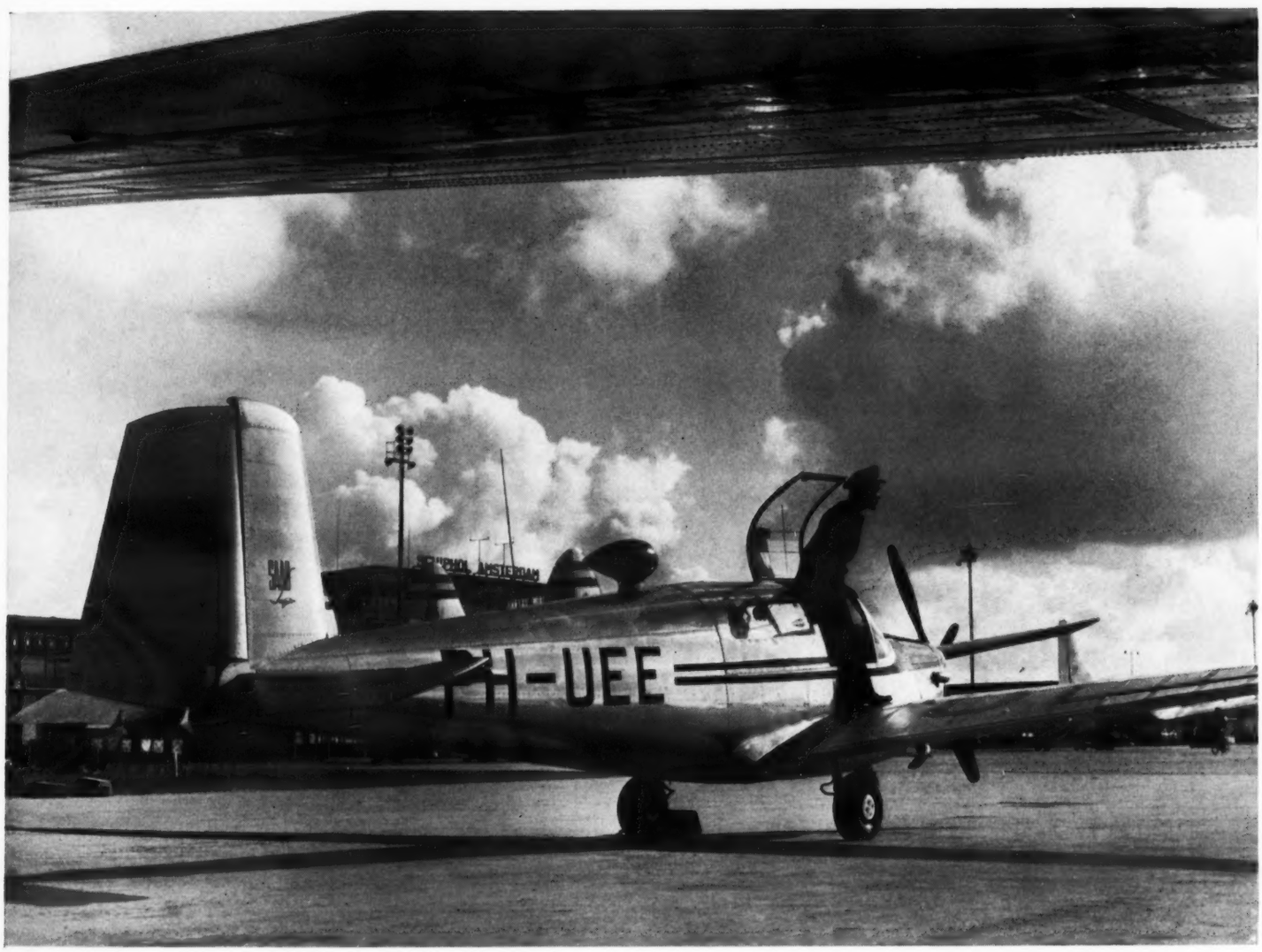
INTERAVIA

REVIEW OF WORLD AVIATION



Price of this issue

U. S. A.:	80 cents
British Isles:	5 s.
Switzerland:	Fr. 2.80
Netherlands:	Fl. 3.—
Denmark:	d. Kr. 5.—
Germany:	DM 3.—
France:	Fr. 250
Italy:	Lire 410

IN THIS ISSUE

Commercial Air Training

VOLUME VII 11 1952

SKYDROL travels with KLM

WHETHER your business or vacation takes you to Cuba, Belgium, India, the United States... or anywhere in the world... KLM is at your service. KLM, the world's first airline, has always given first attention to its famous "guarantee of perfect service to the passenger."

Skydrol, too, offers perfect service — to KLM. Skydrol, Monsanto's fire-resistant hydraulic fluid, serves in the cabin superchargers and hydraulic systems of KLM's new DC-6B's. Soon, *all* of KLM's Douglas planes will be flying with Skydrol.

A long-lasting fluid, Skydrol is high in lubricity. Because of its longer service life, Skydrol lowers maintenance cost. It is stable at operating temperatures noncorrosive to aircraft metals, and is nontoxic. It eliminates the possibility of fires due to hydraulic line failures.

Skydrol now serves 15 major airlines through out the world.

For complete technical data on Skydrol, write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 800 NorthTwelfth Blvd., St. Louis 1, Mo., U.S.A.

Skydrol: Trade-mark registered.

Skydrol is available through:
Esso Export Corporation

MONSANTO
CHEMICALS - PLASTICS

SERVING INDUSTRY...
WHICH SERVES MANKIND

INTERAVIA

Review of World Aviation

Volume VII — No 11 — 1952

Editor: E. E. Heiman
Executive Editors: P. A. Blackburn, E. Herzfeld, H. Rieck
Associate Editors: A. de Rham, J. M. Stroud, J. Jenni, E. Baur, A. Arbex, Ginés de Bracamonte
Art Editor: H. W. Mahrer
Circulation: E. S. Annaheim

Contents

COMMERCIAL AIR TRAINING

Importance of Civil Air Training		**607**
From Fighter Pilot to Airline Captain		**608**
Training Commercial Pilots from Scratch	A. VIRULY, AMSTERDAM	**610**
Interview with Heinz	H. ERNST, ZURICH	**613**
From Piston Engines to Jets	E. E. RODLEY, LONDON	**614**
Helicopter Pilot School	H. BORIS, CORMEILLES	**617**
Air France Engages German Girls		**619**
How to become an Air Hostess		**620**
Flight Simulators		**622**
Training Air Traffic Controllers		**625**
Fokker and Fairchild Sign Licence Agreement		**627**
Book Reviews		**627**
Farnborough Parade		**628**
Destination North Pole		**634**
I.A.T.A. at Work and Play		**636**
What's in the Air ?		**639**
Mostra dell'Aeronautica, Milan		**641**
Helicopter Terminals	G. KÜHNE, BERLIN	**644**

Front Cover :

A Swedish SAAB "Safir" single-engined trainer of the Netherlands Government Civil Flying School at Schiphol Airport, Amsterdam. "Safirs" are being produced under licence in Holland by the De Schelde aircraft and ship-building company at Dordrecht, near Rotterdam.

Appears Monthly in Four Editions : English, French, Spanish and German.

Advertising Department, Publishing and Editorial Offices, Subscription Department : Interavia S. A., 6, Corraterie, Geneva. Telephone : 5 42 34 (five lines). Cables and Telegrams : Interavia-Geneva.

Annual Subscriptions : Switzerland, Sw. frs. 28.00; U. S. A. and Canada, U. S. $7.00; Great Britain, £2 6s 0d; France, Fr. frs. 2,400; Belgium, Belg. frs. 360.00; Holland, Fl. 31.00; Germany, DM 28.00; Sweden, Kr. 35.00; Norway, Kr. 50.00; Spain, Ptas 275.00; Austria, ö. S. 170. Brazil, 230 Cr$; Uruguay, 23 pesos. All other countries : Sw. frs. 28.00.

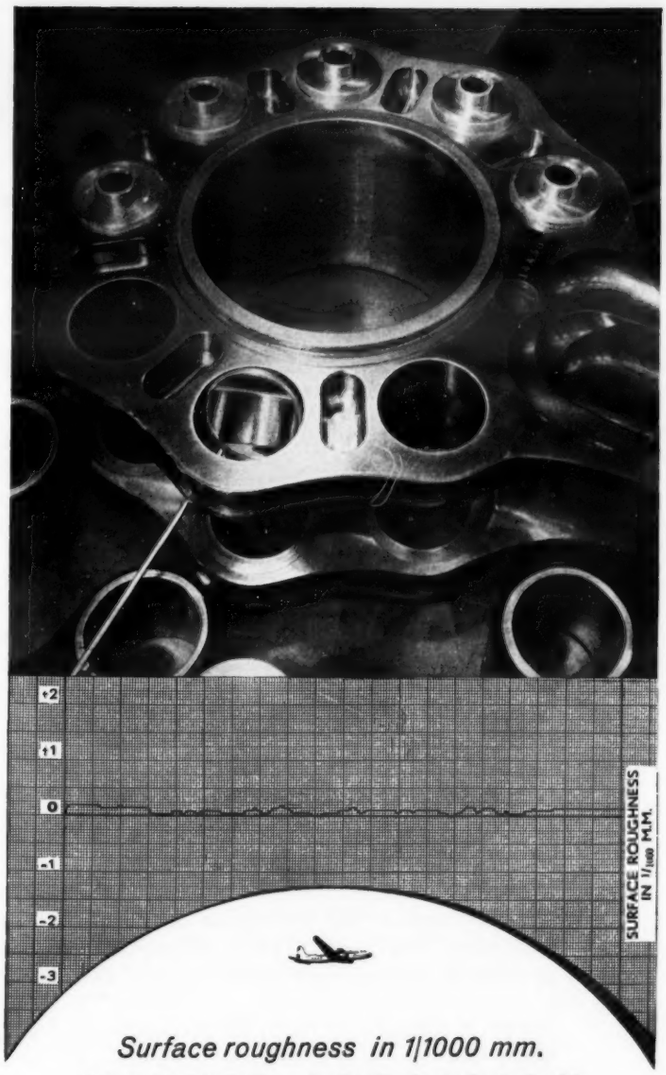
Agents and Distributing Offices :

INTERAVIA AUSTRIA :	Morawa & Co., Wollzeile 11, Vienna I.
INTERAVIA BELGIUM :	Office de Publicité, 16, Rue Marcq, Brussels.
INTERAVIA BRAZIL :	R. F. Besnard, 91 av. Almirante Barroso, S. 417-419, Rio de Janeiro. 131, rua Marconi 5º And., Sao Paulo.
INTERAVIA CANADA :	Wm. Dawson Subscription Service Ltd., 60 Front Street West, Toronto, Ontario.
INTERAVIA DENMARK :	Dansk Centralagentur, Stormgade 20, Copenhagen.
INTERAVIA FINLAND :	Akateeminen Kirjakauppa, Keskuskatu 2, Helsinki - Rautatiekirjakauppa Oy, Köydenpunojank 2, Helsinki.
INTERAVIA FRANCE :	144, Champs-Elysées, Paris VIIIe.
INTERAVIA GERMANY :	Interavia GmbH., Tieckstr. 5, Cologne-Ehrenfeld. Subscriptions and single copies : Ausland-Zeitungshandel W. E. Saarbach, Gereonstrasse 25-29, Cologne 1. Postal Cheque Account Cologne 25823.
INTERAVIA GREAT BRITAIN :	Interavia (United Kingdom) Ltd., 2-5, Old Bond Street, London, W. 1.
INTERAVIA HOLLAND :	Rotterdamsche Couranten-Import en Kioskenonderneming v/h van Ditmar, Postbus 262, Rotterdam.
INTERAVIA IRELAND :	Basil Clancy, Esq., Cooleevin, Foxrock, Co. Dublin.
INTERAVIA HUNGARY :	Kultura, Akademia-utca, 10, Budapest, V.
INTERAVIA ISRAEL :	F. Pinczower P.O.B. 6008, Tel-Aviv.
INTERAVIA ITALY :	30 Via San Marino, Rome.
INTERAVIA NORWAY :	Narvesens Kioskkompani A.S., Box 125, Oslo.
INTERAVIA SOUTH AFRICA :	P. O. Box 6073, Johannesburg.
INTERAVIA SPAIN :	Litavia, Maestro Victoria 8, Madrid.
INTERAVIA SWEDEN :	Postbox 29, Linköping.
INTERAVIA URUGUAY :	R. F. Besnard, Edificio Artigas, Rincón 487, Montevideo.
INTERAVIA U.S.A. :	385 Fifth Avenue, Room 1408, New York 16, N. Y. Subscriptions also from the International News Co., 131 Varick Street, New York, N. Y.

Copyright 1952 by Interavia S. A., Geneva, Switzerland

Printed in Switzerland

Imprimeries Populaires, Geneva — Héliographia S. A., Lausanne
Imprimerie de "La Tribune de Genève", Geneva



Surface roughness in 1/1000 mm.

MINUTE PRECISION

just the job for KLM

Engine overhauls and other repairs of aircraft require the highest accuracy. Secure every benefit from the scrupulous work of KLM's Repairshop, where e.g. surface roughness is indicated by means of graphics when knuckle pin holes are ground to a glassy smoothness. For a thorough, C.A.A. approved job, contact

KLM's TECHNICAL DIVISION
SCHIPHOL AIRPORT

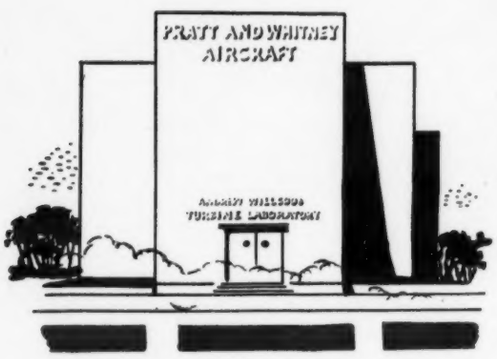
Amsterdam
Holland

KLM
ROYAL DUTCH
AIRLINES

UNITED AIRGRAM

UNITED AIRCRAFT EXPORT CORPORATION

PRATT & WHITNEY TO ENLARGE JET DEVELOPMENT — A program for enlarging jet engine development and test facilities at Pratt & Whitney Aircraft's main plant at East Hartford was announced recently. The company-financed program will cost several million dollars, and calls for an addition to the Andrew Willgoos Turbine Laboratory and conversion of a number of experimental test cells from piston to jet work.



These additional jet engine facilities are required by Pratt & Whitney Aircraft's rapidly expanding role in jet engine development and production, and will enable this Division to accelerate its jet development program and help reduce the time it takes to get a new engine into production.

Three new high altitude test cells will be added to the Willgoos Laboratory. These cells will be capable of testing full scale advanced type jet engines under conditions simulating supersonic speeds and altitudes up to 55,000 feet. The Willgoos Laboratory now has a single cell of this type. The additional test units will maintain the laboratory's position as the most complete privately owned jet development facility in the world.

PRATT & WHITNEY AIRCRAFT TO MAKE RAMJET ENGINES — Late in August it was announced that the Pratt & Whitney Aircraft Division will extend its range in the jet field by developing and building ramjet engines for high-speed guided missiles. The project is being undertaken for the United States Navy.

At the same time it was revealed that Pratt & Whitney Aircraft will have the advantage of six years of research on ramjets which has already been conducted at East Hartford by the Research Department of United Aircraft Corporation. The ramjet engine research program was commenced under U.S. Navy auspices in 1946, and a new laboratory, built exclusively for study of ramjet burners, has been operated by United Aircraft's Research Department since April 6, 1950.

PRATT & WHITNEY AND HAMILTON STANDARD PRODUCTS ON NEW JET AIRPLANE — Two divisions of United Aircraft Corporation — Pratt & Whitney Aircraft, and Hamilton Standard — played an important part in American Airpower's latest answer to air invasion.

The U.S. Air Force announced recently its newest automatic jet warplane, the Lockheed F-94C Starfire, an all-weather interceptor. The Starfire is the first production aircraft to fly with the new Pratt & Whitney J-48-P-5 jet engine, which

produces a 6,250-pound thrust without afterburner. When using an afterburner, a device which reignites the jet exhaust, thrust rises appreciably, making the Starfire the most powerful single-engine airplane in production in the U.S. today.

SIKORSKY HELICOPTER MAKES 5,000TH ARS PICKUP IN KOREA -- The 5,000th rescue of a fighting man in the Korean war by the U.S. Air Force 3rd Air Rescue Squadron was accomplished on June 21, when a sergeant, who had been badly wounded during a battle for a vital Korean hill, was evacuated from a front-line first-aid station to a behind-the-lines surgical hospital by a Sikorsky H-5 (S-51) helicopter.

The sergeant was hit by an enemy shell at 3:15 a.m. on the morning of June 21, and an hour later was at a first-aid station near the front. At 7:45 a.m., the helicopter which flew him from the front landed, and 25 minutes later, the patient was at the Army mobile surgical hospital in the rear area.

The 5,000 pickups by the 3rd ARS since the start of the Korean conflict have included many rescues of pilots and crewmen shot down behind enemy lines, as well as the evacuation of wounded soldiers. The rescues, a number of which were accomplished in the face of enemy ground-fire, have been both on land and in coastal waters. In addition to Sikorsky H-5s and Sikorsky H-19s, Grumman SA-16 amphibians have been used.

SIKORSKY H-19 HELICOPTERS MAKE FIRST TRANS-ATLANTIC HOP -- Two U.S. Air Force Air Rescue Service Sikorsky H-19 helicopters landed at Prestwick, Scotland, on July 31 to complete the first trans-Atlantic helicopter flight in aviation history. The two big Sikorskys made the cross-ocean flight as part of a journey that took them from Westover Air Force Base, Massachusetts, to Wiesbaden, Germany. The mission was undertaken by the U.S. Air Force to investigate the problems of long-range ferrying of helicopters.

Total distance covered by the two helicopters in their flight from Westover to Prestwick was 3,535 miles. Air time was 42 hours and 25 minutes. No mechanical difficulties were encountered, but adverse weather conditions at several stops enroute stretched the elapsed time for the Atlantic crossing to 15 days, eight hours.

Project commander was Major Richard B. McVay, and the four crew members of the helicopters were Capt. V.H. McGovern, Capt. H.C. Jeffers, Lieut. H.W. Moore, and Capt. G.O. Hambrick. The Air Rescue Service, under the command of Col. J.C. Bailey had over-all responsibility.

Highly important accomplishments of the trans-ocean trip included a demonstration of the fact that in the future it may be more convenient and faster to ferry big helicopters to their destinations than to disassemble them and ship them by another carrier. The test also raised the potential value of helicopters by showing how large helicopters of the future could be stationed at a few strategic spots in various parts of the world and could, on short notice, fly to virtually any place on the globe within a few hours.

UNITED AIRCRAFT EXPORT CORPORATION
EAST HARTFORD 8, CONNECTICUT, U.S.A.
European office: 3/5 Warwick House Street, London, SWI, England.

FIAT

44 years of technical progress in aircraft design

From the first aircraft engine (1908) to the G. 80 jet aircraft

At the Mostra dell'Aeronautica held at Forlanini Airport, near Milan, in September, Fiat showed a wide selection of its past and present aeronautical products : aircraft, engines and propellers. Fiat's exhibit illustrated this progress step by step. The main aircraft prototypes of various types designed and produced in series by Fiat and its associates total 124, from the beginning up to today. Total number of engine types built by Fiat is 46.

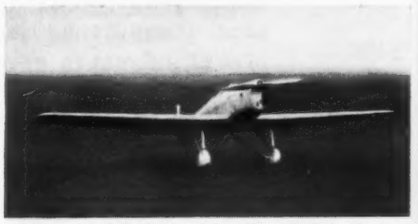
1914 FIAT Farman 5B aircraft, FIAT A 10 engine of 110 cv (approx. 1000 were made of the FIAT A 10)

1919 FIAT BR aircraft, 700 cv FIAT A 14 engine (holder of a number of world speed and altitude records. At the time the A 14 was the most powerful engine in the world)

1928 FIAT AS 1 aircraft, 100 cv FIAT A 50 engine (7,200 mile flight from Vercelli to Tokyo and 18,000 mile tour of Africa)

1932 FIAT G 2 aircraft, FIAT AS 60 engine of 135 cv (first FIAT transport aircraft with fully cantilever wing)

1933 FIAT CR. 32 aircraft, 600 cv FIAT A 30 RA engine (fighter built in large quantity. First formation flight to European capitals. Several first prizes in acrobatic competitions for aircraft in formation)



1933 FIAT G. 5 aircraft, 135 cv FIAT A 60 engine (touring aircraft with cantilever wing)

1935 FIAT G.18 aircraft, 700 cv FIAT A 59R (Hornet) engine (twin-engined civil aircraft used on international routes)

1936 FIAT BR. 20 aircraft, 1000 cv FIAT A 80 RC41 engine (twin-engine bomber built in several versions. 1939 — Non-stop Rome-Addis Ababa flight — 2,800 miles — at record speed)

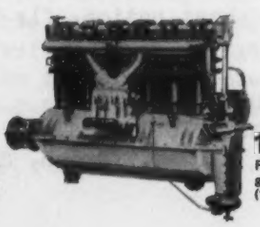
1937 FIAT G.50 aircraft, 740 cv FIAT A 74 RC38 engine. (first FIAT fighter with cantilever wing, built in quantity in several versions)

1942 FIAT G.55 aircraft, 1050 cv FIAT RA 1050 (D.B. 605) engine. Fighter built in large numbers.

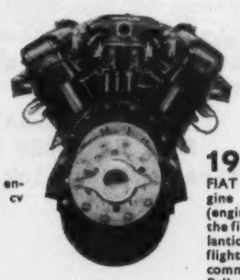
1947 FIAT G.46 aircraft, 250 h.p. D.H. Gipsy Queen 30 engine (basic and primary trainer and sporting aircraft; built in quantity in several versions)

1947 FIAT G.212 CP aircraft, 1050 h.p. Pratt & Whitney R 1830 engine (three-engined aircraft in versions for civil transport, cargo, training — flying classroom)

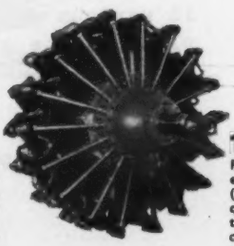
1908 FIAT SA 8/75 engine, 50 cv (Fiat's first aircraft engine)



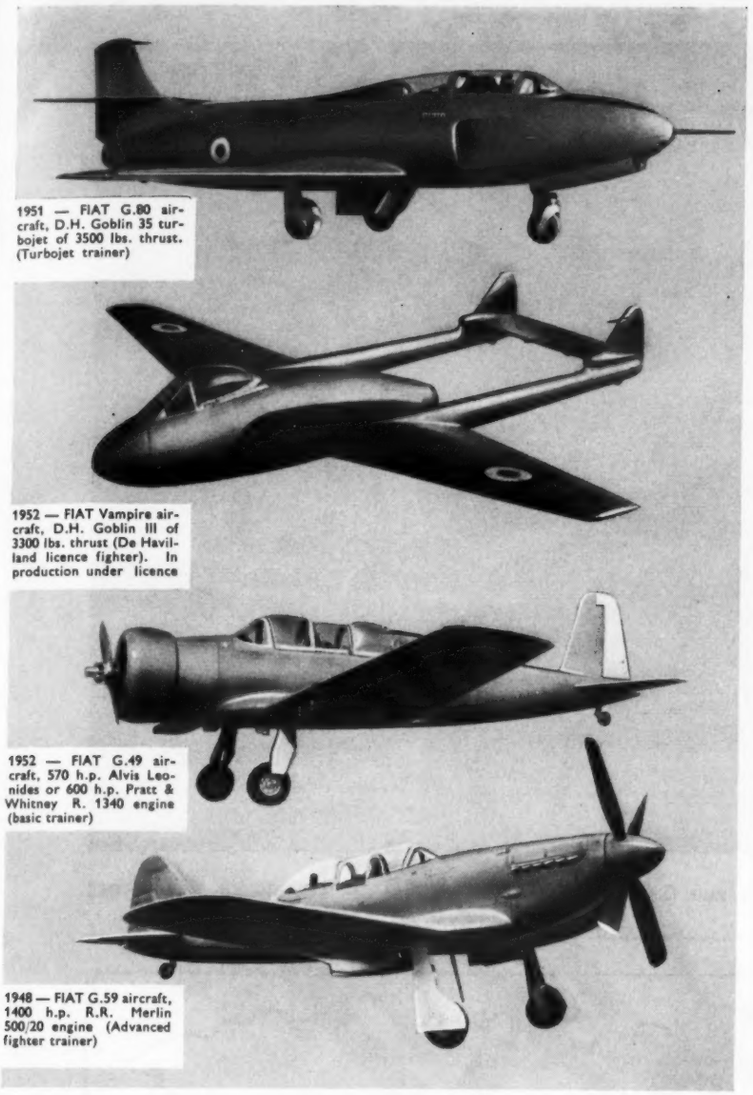
1916 FIAT A 12bis engine of 300 cv (13,260 made)



1929 FIAT A 22 R engine of 610 cv (engine used in the first trans-Atlantic formation flight under the command of Italo Balbo — 1931)



1935 FIAT A 80 RC41 engine of 1000 cv (built in large quantities and fitted in a number of civil and military aircraft)

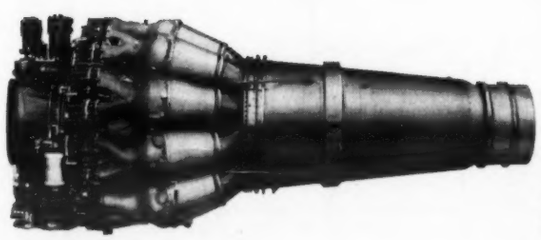


1951 — FIAT G.80 aircraft, D.H. Goblin 35 turbojet of 3500 lbs. thrust. (Turbojet trainer)

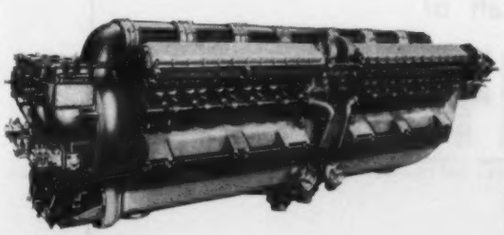
1952 — FIAT Vampire aircraft, D.H. Goblin III of 3300 lbs. thrust (De Havilland licence fighter). In production under licence

1952 — FIAT G.49 aircraft, 570 h.p. Alvis Leonides or 600 h.p. Pratt & Whitney R. 1340 engine (basic trainer)

1948 — FIAT G.59 aircraft, 1400 h.p. R.R. Merlin 500/20 engine (Advanced fighter trainer)



1951
FIAT-GHOST turbojet, 5000 lbs thrust (de Havilland licence)



1931
FIAT AS 6 engine, 310 cv. (absolute speed record for seaplanes: 1934 — 709.209 km/h)

To and from ROME

Egypt
Eritrea
Somaliland
Libya
Greece
Lebanon
Portugal
Venezuela
Portugal
Brazil
Argentina

Fly

ALITALIA

ALITALIA'S four-engined "SUPERMASTERS" offer an unsurpassable free bar and restaurant service with first-class Italian cooking and vintage wines. Free air mail — All the comfort of your own home.

Once you have flown ALITALIA you will always fly ALITALIA

All information from your travel agency,
ALITALIA
agency or head office

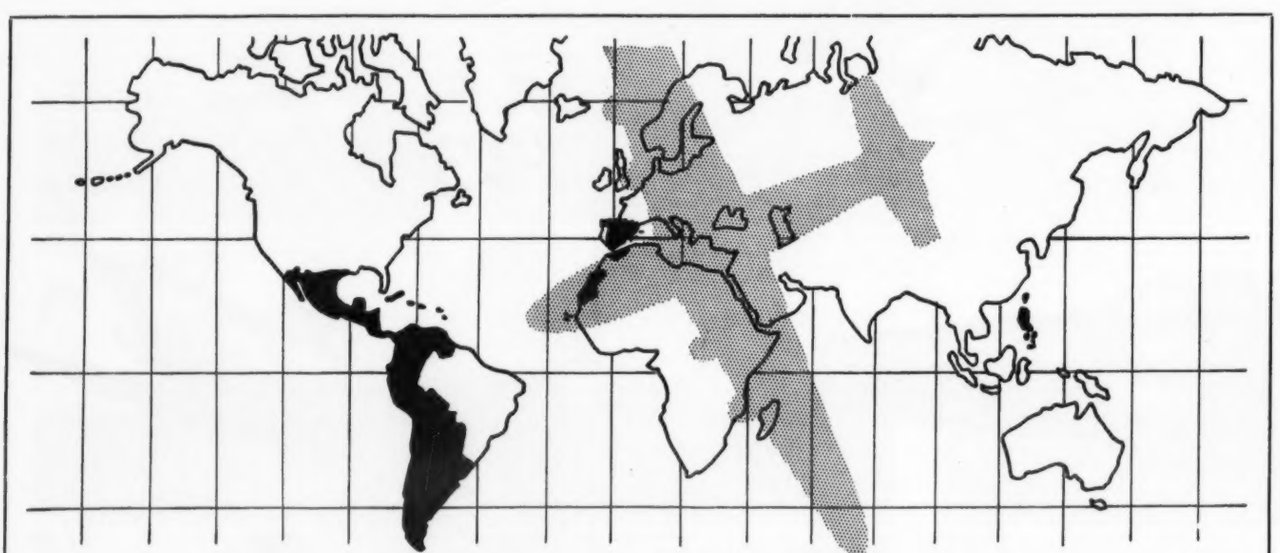
20, Via Bissolati
ROME

M.S 733

THE MOST UP-TO-DATE OF TRAINERS

MORANE-SAULNIER

S. A. des Ateliers d'aviation Louis BREGUET — 24, rue Georges Bizet, PARIS 16e — Téléphone Passy 9093



Over 120 million people speak Spanish!
You can reach them on the aircraft of

IBERIA

LINEAS AEREAS ESPAÑOLAS

From Madrid to : Buenos Aires, Caracas, Porto Rico, Havana, Mexico, Paris, London, Geneva, Rome, Lisbon, Canaries, Tangier, Spanish Morocco and the whole of Spain.

ON THE PRINCIPAL ROUTES OF
AIR FRANCE
you will travel by "CONSTELLATION"
"the Atlantic favorite"

To all seasoned air travellers the name "Constellation" has come to symbolize reliability, speed and comfort.

For several years Air France's every effort has been directed towards offering all its passengers on long-distance services the privilege of travelling by this wonderful aircraft.

Today Air France is proud to be able to announce that this result has been achieved on all its major international services.

You can go by Constellation

To South America : Recife, Rio, Buenos Aires. To Africa : Dakar, Konakry, Duala and to Madagascar. To the principal cities of Europe and the Near and Far East. Finally between Paris and New York you can enjoy the added comfort of a sky lounge chair.

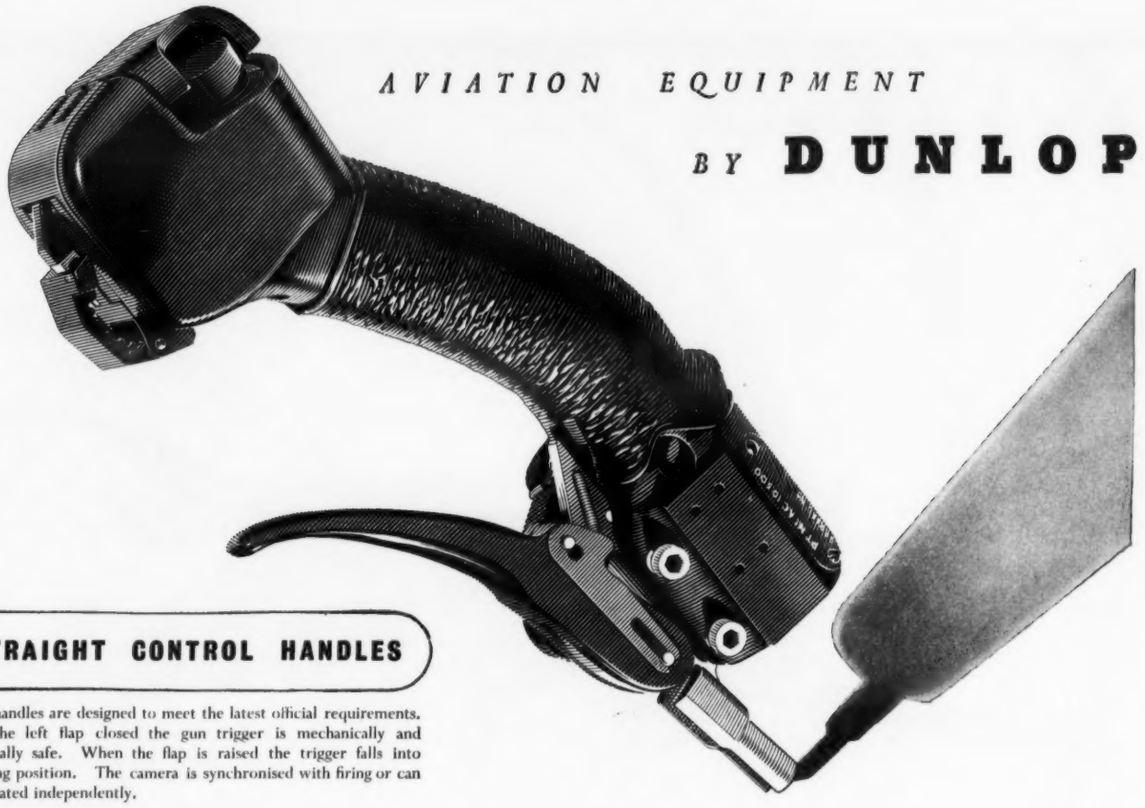
AIR FRANCE

ALL TRAVEL AGENCIES AND 119 CHAMPS-ÉLYSÉES - BALZAC 70-50 - 2 RUE SCRIBE - OPÉRA 41-00

These figures speak for themselves
In 1947 : 423,115 passengers
In 1950 : 774,906 passengers
In 1951 : 1,000,000 passengers

AVIATION EQUIPMENT

BY **DUNLOP**



STRAIGHT CONTROL HANDLES

These handles are designed to meet the latest official requirements. With the left flap closed the gun trigger is mechanically and electrically safe. When the flap is raised the trigger falls into the firing position. The camera is synchronised with firing or can be operated independently.

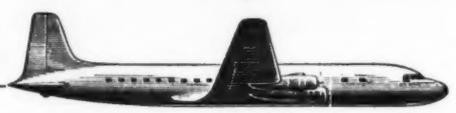
DUNLOP RUBBER COMPANY, LTD. (AVIATION DIVISION) FOLESHILL, COVENTRY • *Depots throughout the World*

1H/616

SOUTH AFRICA - *Where the modern mixes with barbaric splendor.*

ENGLAND - *Big Ben — London's famous Westminster clock.*

Only hours apart... by Air!



When you travel by air, you can spend more time at your destination, or less time away from home. And you'll travel in truly luxurious comfort when you fly Douglas DC-6. In a recent survey, experienced air travelers were asked to name the airplane they liked best — and the overwhelming choice was the DC-6! Make your next reservations aboard a DC-6 — finest of the modern, four-engine air transports. You'll arrive at your destination in hours — not days — ready for business or pleasure.

FLY DOUGLAS DC-6

on these leading airlines of the world

AA *Argentine* - **AMERICAN** *U.S.*
BCPA *Australian New Zealand* - **BRANIFF** *U.S.* - **CMA** *Mexican*
***CONTINENTAL** *U.S.* - ***CPAL** *Canadian* - **DELTA** *U.S.*
* + **FLYING TIGER** *U.S.* - **KLM** *Netherlands* - **LAI** *Italian*
NATIONAL *U.S.* - **PAL** *Philippine*
PANAGRA *U.S.* - **PAN AMERICAN** *U.S.* - **SABENA** *Belgian*
SAS *Danish Norwegian Swedish* - + **SLICK** *U.S.*
SWISSAIR *Swiss* - ***TAI** *French* - + **TRANSOCEAN** *U.S.*
UNITED *U.S.* - ***WESTERN** *U.S.*

*Soon + *Air Freight*

Many of these and other world airlines also fly dependable Douglas DC-3s and DC-4s.

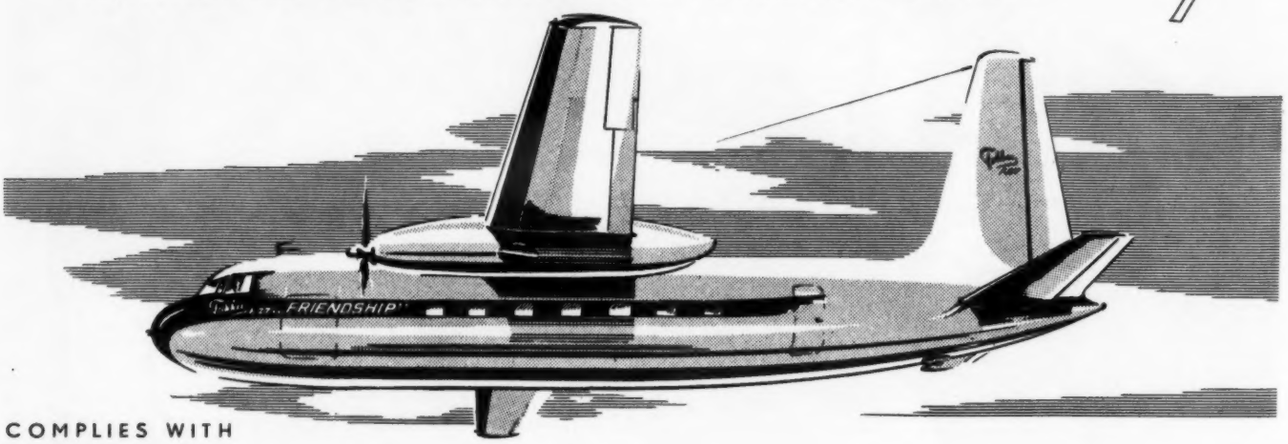
Twice as many people fly

DOUGLAS as all other airplanes combined

Depend on Douglas world's largest builder of aircraft for 32 years - Military and commercial transports - Fighters - Attack planes - Bombers
Guided missiles - Electronic equipment - Research

FOKKER F.27 *Friendship*

28-PASSENGER MEDIUM-RANGE TWIN-TURBOPROP AIRLINER



COMPLIES WITH

ICAO

REQUIREMENTS

ECONOMICAL IN USE AND CHEAP IN MAINTENANCE

ROYAL NETHERLANDS AIRCRAFT FACTORIES

Fokker

AERONAUTICA MACCHI

VAREse (ITALY)

AER MACCHI

FIGHTERS

M. B. 324
Single-seater jet

D. H. 100 "VAMPIRE"
Single-seater jet
DE HAVILLAND licence

TRAINERS

M. 416
Side-by-side two-seater - Primary trainer
FOKKER S. 11 licence - LYCOMING engine

M. B. 323
Two-seater in tandem
Basic trainer

PRIVATE AND EXECUTIVE AIRCRAFT

M. B. 320
Twin-engined six-seater
(CONTINENTAL E. 225 engines)
Range 1620 km
Consumption 20 litres per 100 km

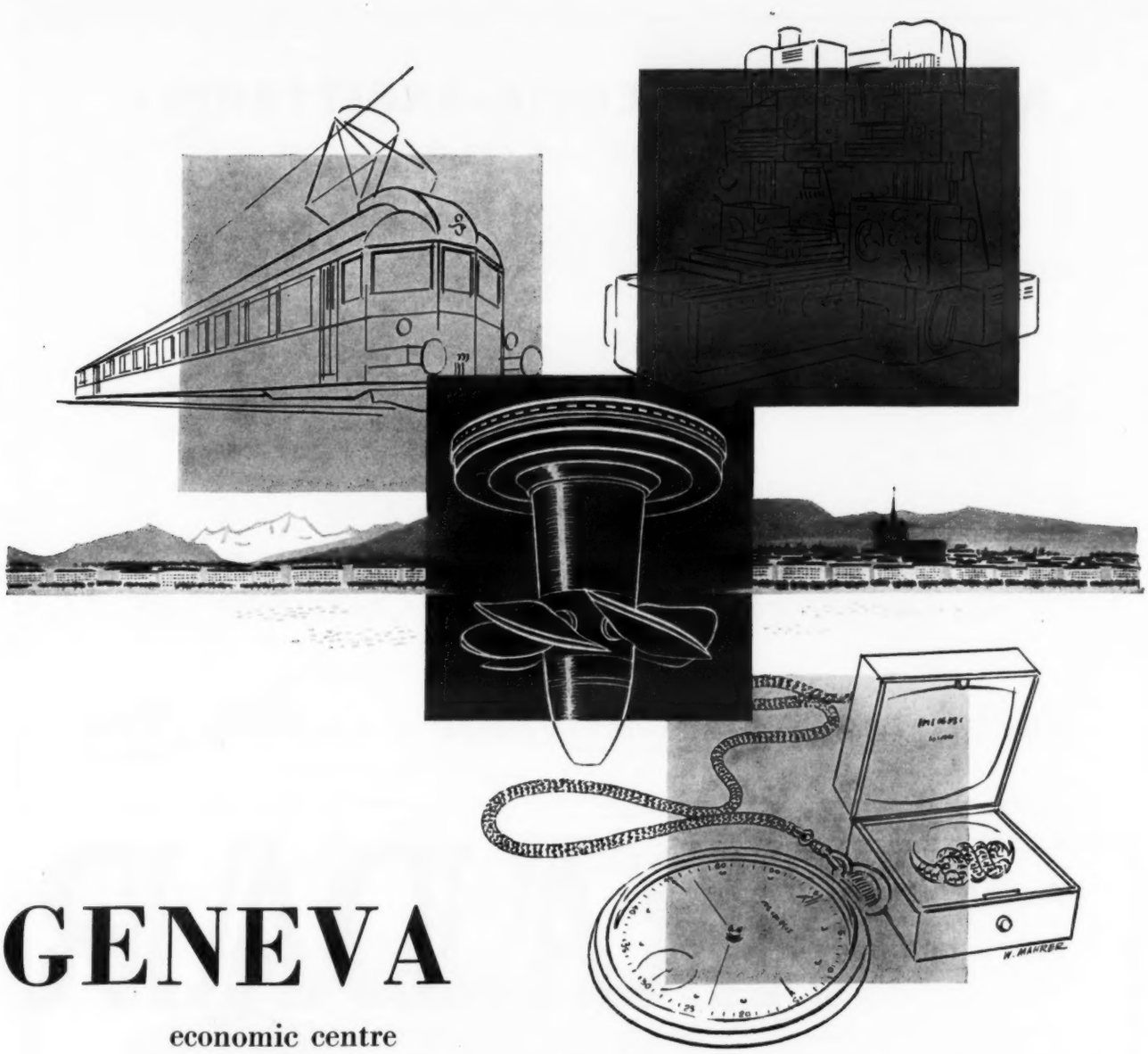
M. B. 308
Side-by-side two-seater
(CONTINENTAL C. 85/C. 90 engine)
Range 800 km
Consumption 10 litres per 100 km

M. B. 308
Side-by-side two-seater seaplane
(CONTINENTAL C. 90 engine)
Range 600 km
Consumption 10 litres per 100 km

Sales organization :

SOCIETÀ COMMERCIALE AERONAUTICA MACCHI

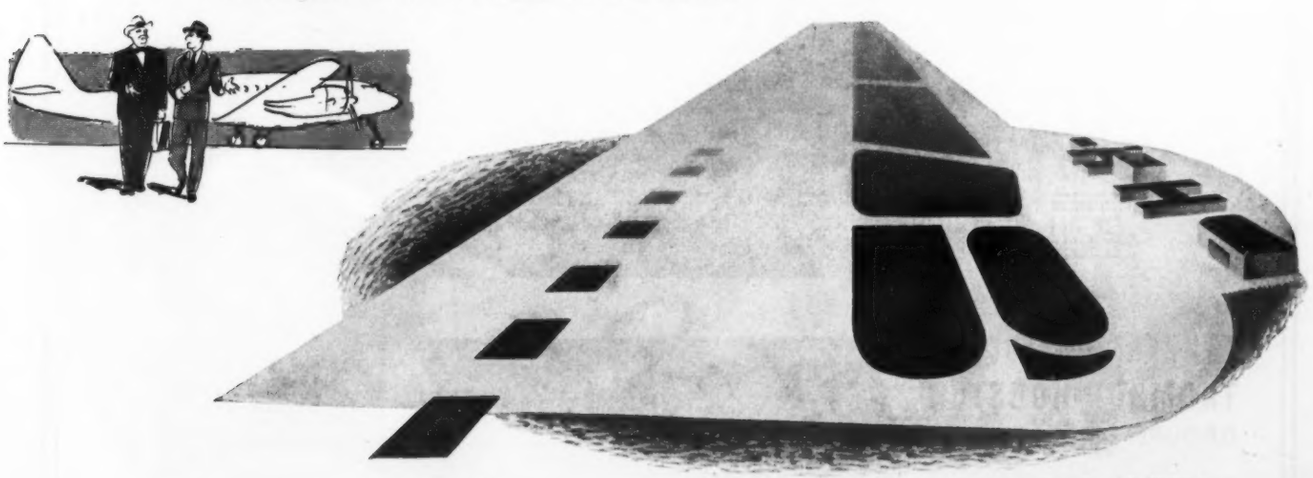
Corso Vitt. Emmanuele 31 — MILAN — (Tel. 700.402)



GENEVA

economic centre

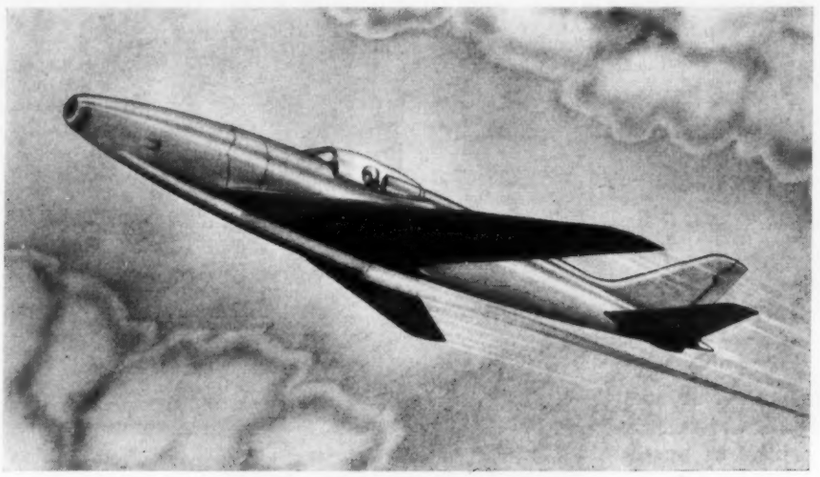
city of craftsmen, industry and commerce, international business centre, easily accessible from all parts of the world thanks to its air services.



GENEVA INTERCONTINENTAL AIRPORT

AMBROSINI «FRECCIA-SAGITTARIO»

fitted with a Turboméca Marboré II jet engine of 880 lbs. thrust

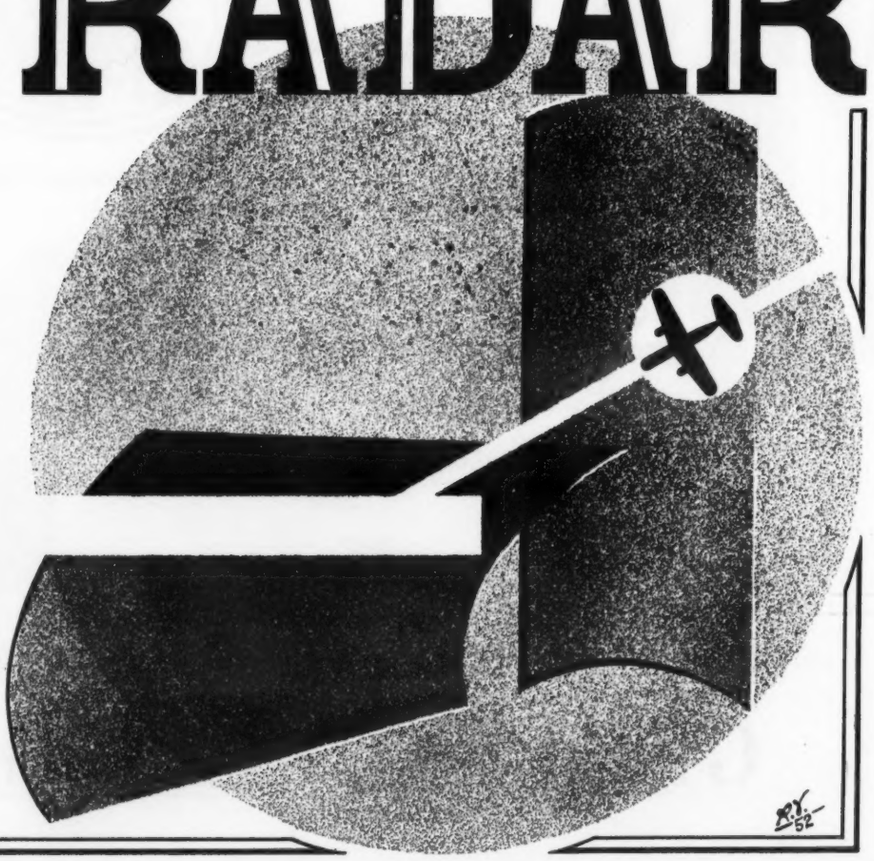


Designed and built by

SOCIETA AERONAUTICA ITALIANA ING. A. AMBROSINI & CO.

For all types and uses of

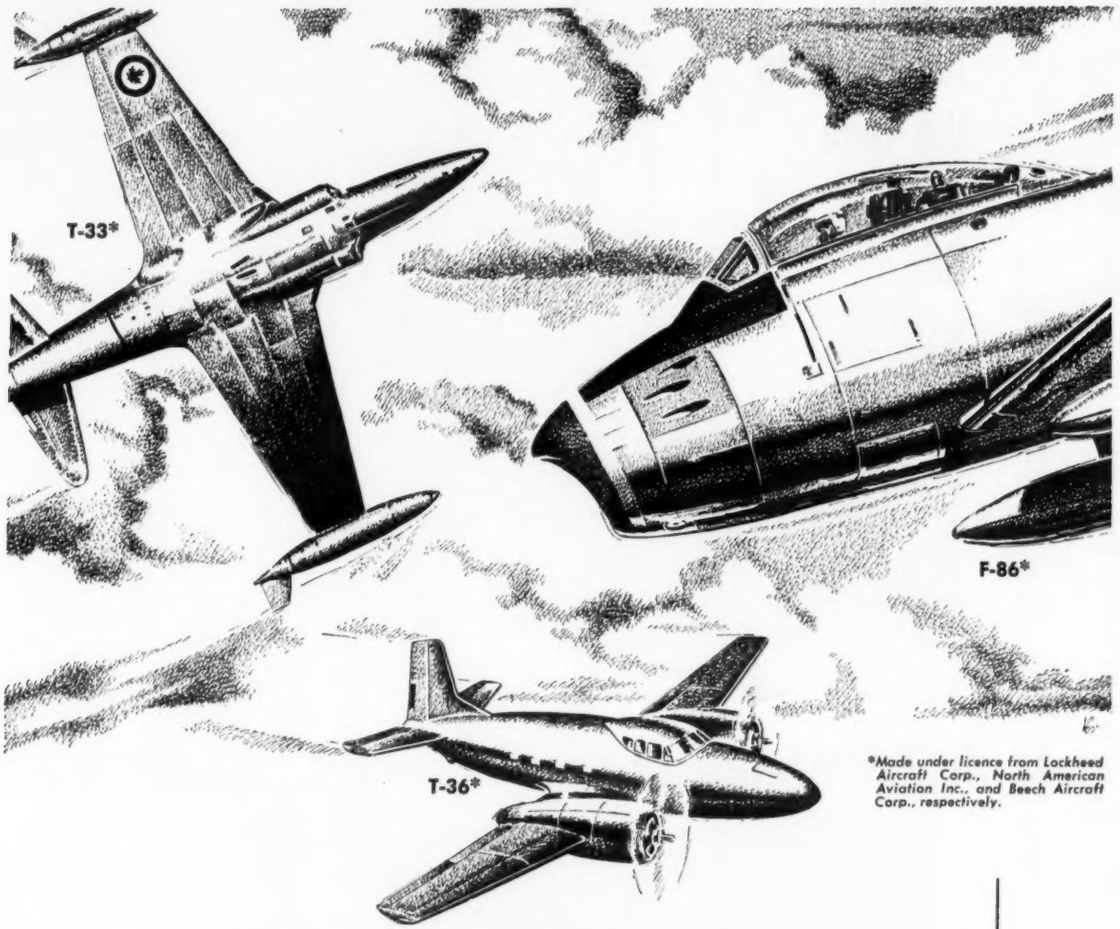
RADAR



CFTH

COMPAGNIE FRANÇAISE
THOMSON-HOUSTON
GROUPE ÉLECTRONIQUE

DIRECTION COMMERCIALE
4, RUE DU FOSSÉ-BLANC - GENNEVILLIERS
SEINE - FRANCE GRÉSILLONS 33-05



*Made under licence from Lockheed Aircraft Corp., North American Aviation Inc., and Beech Aircraft Corp., respectively.

What are we building at Canadair?

Canadair is building high speed "T-33" jet trainers and "T-36" trainer transports... while accelerated production of F-86 'Sabre' jet fighters continues unhindered.

In the production of three types of aircraft, Canadair exhibits the high flexibility of this Canadian plant. It is this ability to handle varied assignments *simultaneously* that has aroused such interest in military and civil aviation circles.

Watch Canadair: its versatility, its production capacity, its ability to deliver aircraft on schedule, its high quality of workmanship; — all merit the attention of astute buyers of aircraft throughout the world.

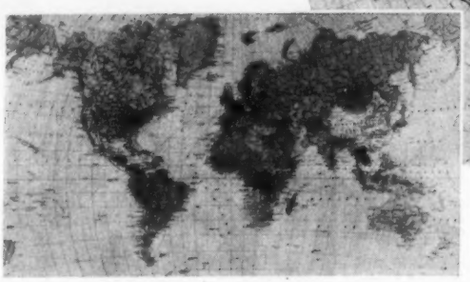
For further information: European Representative, J. H. Davis, Princes House, 190 Piccadilly, London, W1, England.

Vignettes of
CANADA—AIR LAND

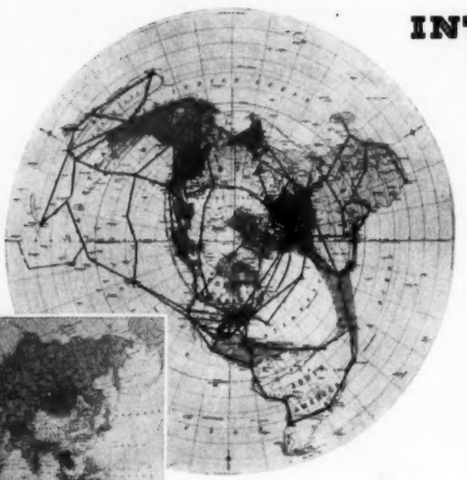
Doctor parachutes to stricken child . . . recently an Army doctor and two R.C.A.F. helpers were dropped by parachute to an isolated New Brunswick village, where the 8-year old daughter of a fisherman was fighting for her life, suffering from a ruptured appendix. Such humanitarian services on the part of the men of the R.C.A.F. and Army represent but one of the many stories being written in the annals of Canada's air history. The use of aircraft has indeed become an established part of Canadian life in a country that has been air-minded since flying began.

Canadair
LIMITED, MONTREAL, CANADA

Aviation is changing the face of the world...



old map



new map

INTERAVIA

Paris
Tokyo
Amsterdam
New York
Brussels
Cologne
Madrid
Buenos Aires
London
Stockholm
Johannesburg
Rome
Montreal
Los Angeles

...and INTERAVIA follows this development from day to day

INTERAVIA *Air Letter*

Day-by-day news of world aviation

Three language editions (English, French, German), by air mail

●

INTERAVIA

Review of World Aviation

The leading illustrated monthly magazine. Four language editions (English, French, Spanish, German)

●

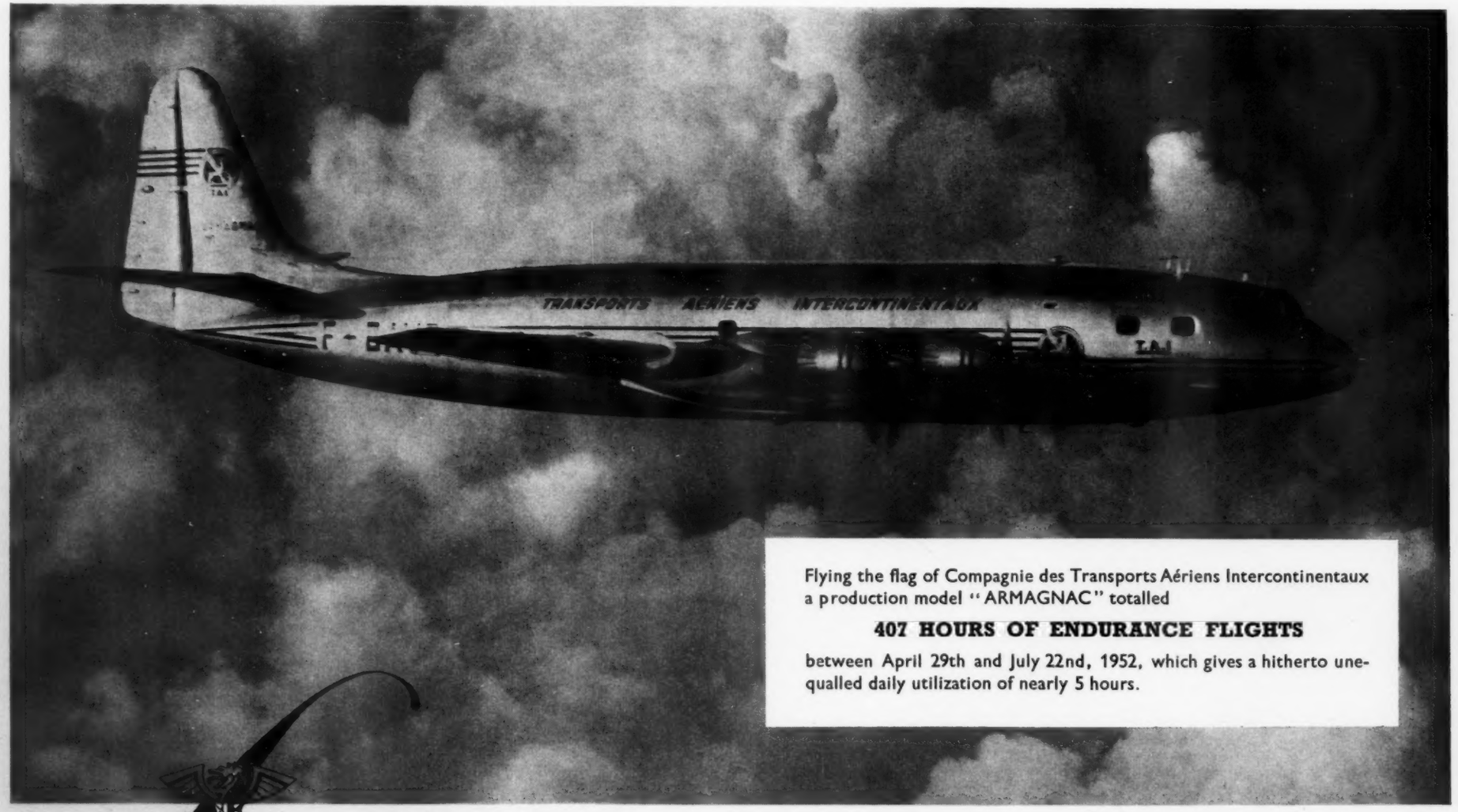
In preparation :

INTERAVIA ABC

Directory of World Aviation

Five languages (English, French, Spanish, Italian, German)

New 1953 edition of our standard pre-war publication



Flying the flag of Compagnie des Transports Aériens Intercontinentaux a production model "ARMAGNAC" totalled

407 HOURS OF ENDURANCE FLIGHTS

between April 29th and July 22nd, 1952, which gives a hitherto unequalled daily utilization of nearly 5 hours.

L'Armagnac **BUILT IN QUANTITY BY**

SOCIÉTÉ NATIONALE DE CONSTRUCTIONS AÉRONAUTIQUES DU SUD-EST

6, AVENUE MARCEAU - PARIS-VIII

909

RADIOELECTRIC ALTIMETERS
with enclosed aerials
AERODROME GONIOMETERS
RADIO COMPASS
(light-weight, accurate)
BAD VISIBILITY RECEIVERS
DECCA NAVIGATOR
with Flight Log
RADAR

sécurité aérienne

SFR

radiocommunications

HERTZIAN CABLES
TRANSMITTERS OF ALL POWERS
TRAFFIC RECEIVERS
MOBILE STATIONS
ELECTRONIC TUBES
QUARTZ AND FILTERS

SOCIÉTÉ FRANÇAISE RADIOÉLECTRIQUE
SOCIÉTÉ ANONYME AU CAPITAL DE 620.000.000 DE FRANCS
79, BOULEVARD HAUSSMANN - PARIS (8E) - TÉL. : ANJ. 84-60

Commercial Air Training

Our October issue, devoted almost exclusively to service air training, covered only half the training story. In spite of increasing air armament throughout the world, commercial air transport, with its rôle of uniting the nations, continues to be of prime interest, and it is right that the training of future commercial crews should be regarded in many quarters as no less important than that of service pilots.

We have therefore asked several of the leading airlines—Air France, KLM, Swissair, BOAC—for particulars of their methods of training. Other articles describe the training of hostesses (TWA), helicopter pilots and traffic control personnel. Unfortunately lack of space prevents us from touching on the training of the pilot's most important technical assistants—flight engineers, radio operators, navigators and, last but not least, the maintenance personnel.

Differences between service and civilian training

Understandably the ultimate aims of training for service and commercial pilots are widely divergent. The former are primarily servicemen and must strive for top performance, whilst commercial flyers are primarily technicians who place their skill and knowledge at the service of the air traveller and must be more concerned with providing *safe travel over a long period.*

There are also differences in methods. A young fighter pilot operating within his own unit must have a high degree of flying skill (plus discipline, courage, gunnery skill, etc.), but needs no more than average knowledge of navigation, engines, economic flying, etc. The flight captain of a regular commercial airline on the other hand need not be a past master at aerobatics, but he must have comprehensive technical and navigational knowledge, not to mention also prudence, judgment, confidence in thought and action. Even under the best conditions these qualities can only be acquired through long years of experience, as second pilot or freighter captain. It is of course true that certain categories of service pilots (of medium and heavy bombers, long reconnaissance aircraft, anti-submarine aircraft, long-range transports) also have to meet largely the same requirements.

Minimum requirements for commercial pilots

International agreements[1] today prescribe that would-be commercial pilots must be at least 18 years old on beginning their training and should as a rule hold a private pilot's licence. They must have a thorough theoretical knowledge of the rules and regulations of air navigation, navigation methods and meteorology, of general theory of flight, and of airframe, engine and instrument operation and maintenance.

Normally the flying training of commercial pilots covers at least 200 hours (though in certain cases 150 hours suffice), and is divided up as follows : 100 hours solo or as first pilot (preceded by at least 20 hours dual) ; 20 hours cross-country flying as first pilot, including one flight of at least 300 nautical miles with two intermediate landings ; 5 hours solo night flying, including 10 night take-offs and 10 night landings (preceded by at least 3 hours dual) ; 10 hours instrument flying training including at least five hours in the aircraft. However, this "embryonic" instrument flying training does not entitle a pilot to make "intentional" solo blind flights. It is merely intended to give him a little knowledge for use in an emergency.

A pilot who has satisfactorily proved his skill and knowledge during training, not only under normal conditions *but also in emergencies* (landings away from base, etc.), will receive from his national authority a *commercial pilot's licence* valid internationally. This entitles him to fly any aircraft with a gross weight of under 5,700 kg. on non-scheduled commercial operations, or any other type of aircraft on non-commercial work. He may also act as co-pilot in any commercial aircraft. Finally he is required to obtain an *instrument rating* as soon as possible (special provisions apply here).

Advanced training

The majority of airlines, however, demand a great deal more than this of their pilots in the matter of flying experience, knowledge of aircraft types and instrument flying qualifications. Aircraft captains are scarcely likely to be youths of 18, but generally experienced men of 30, 40 or even 50, with thousands of hours and millions of miles behind them.

With such men, flying has become virtually second nature. Their reactions are governed not only by conscious thinking and acting but also to an important extent by flying instinct. Such instinct cannot be acquired in a few hours' instruction, but takes at best years.

This said, it can be added that the rules for additional training are not too stringent, where number of hours is concerned. They stipulate, for example, that a pilot who is fully acquainted with the Douglas DC-3 will be able to fly a DC-4 satisfactorily after 15 to 20 hours' conversion training (dual and solo). A similar number of practise hours is considered sufficient to convert from the DC-4 to the Lockheed "Constellation," Douglas DC-6 or Boeing "Stratocruiser," and BOAC even trains its experienced flight captains on jet airliners in another 12 hours. About half of all these hours can be done on flight simulators (see special article in this issue). Needless to say a pilot who switches over from short-stage to long-stage services will have to extend his navigational knowledge considerably (particularly when no navigator is carried) and collect quite a different kind of route experience. Time spent on route reconnaissance will always greatly exceed that on technical conversion training.

* * *

Even this rather summary description shows that modern commercial flying training demands very high standards. Just what these are in detail the reader will be able to gather from the articles and pictures on the following pages.

[1] See Annexe 1 (2nd edition) to the Chicago Convention on Air Navigation, and ICAO *Training Manual*, Part 3 (DOC.7192-AN/857).

Dutreil shows his papers : "Fine . . . Report to the chief pilot at Le Bourget !"

First Dutreil must go over navigation problems again, with twenty other students . . .

. . . and learn all about modern radio aids, e.g., this localiser receiver which is used in the Instrument Landing System.

From Fighter Pilot to Airline Captain*

Ex-Lieutenant Jean Dutreil, aged 25, World War II fighter pilot, holder of the *Croix de Guerre* for ten enemy aircraft destroyed and with 1.200 flying hours to his credit, wants to be a commercial pilot. He first goes to Air France's head office and then to the chief pilot of the Le Bourget training centre, shows his papers, is accepted.

First of all, however, he has to go back to school, to sweat over navigation problems, learn about radio aids, and mug up on traffic regulations. The chief pilot warns : "... Never forget that you are not alone in the aircraft. Absolute discipline is what counts . . . You are not in the air force now !"

Dual control flights in the Caudron Goëland and DC-3 give an old hand like Dutreil no trouble—at any rate as long as he has visibility. He makes friends with VHF and radio compass and has his first conversations with area control and control tower. But then the real work begins—*instrument flying training.*

Dutreil gets into one of the training centre's many Link Trainers, puts on his headphones and closes down the cover . . . The instructor's voice comes through : "Ready ?—Your present course is 15 degrees. You are 60 miles due east of Le Bourget. Altitude 5,000 ft., wind 40 m.p.h. from 250 degrees south west. Land on the North-south runway."

The tiny box makes the most astonishing movements. Quite a stubborn beast . . . and dark as the inside of Jonah's whale. Dutreil clutches joystick and pedals and stares at his instruments : hold the artificial horizon steady, correct course for wind drift, keep speed constant . . . But the instructor has to remind him : "Watch your altimeter ; you must

* *"Pilote de guerre... pilote de ligne,"* Air France feature film on its pilot training. Script : Ives Ciampi ; technical advisers Commandant Forget and M. Gioffredy of the *Centre de Perfectionnement du Personnel Navigant d'Air France,* Le Bourget.

Dual control flights in the Caudron Goëland give an old hand like Dutreil no trouble. But then he comes to more serious matters—blind flying training.

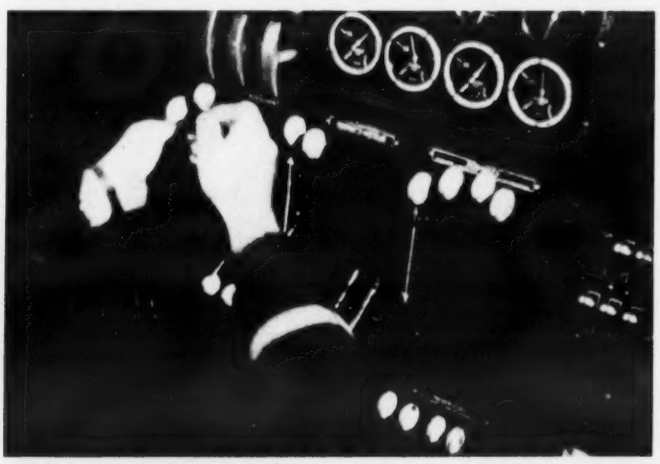
Closing the lid on the Link Trainer.

Ready ? Course 15 degrees. Position 60 miles east of Le Bourget... Land on the North-south runway.

keep to the required altitude . . ." Now he must turn on to the approach lane, using nothing but turn-and-bank indicator, watch and compass. The instructor's voice again : "You're turning too fast. Remember you've got passengers behind. No stunts ! . . . That'll be enough for today."

This is the first of half a hundred such "sessions," pleasantly varied by day and night flights in the DC-3. Then comes a flight in a SO 161 Languedoc, where Dutreil must show what he's learned on the ground. Curtains are closed and the outboard engines shut off. Off we go, straight ahead, left turn, right turn. "Where are you ?" Dutreil beams : "On the approach line !" "*Eh bien,* land !" Dutreil throttles down to approach speed, lets down undercarriage and flaps. Down they go slowly. 500 feet from the ground the instructor tears aside the curtain... *Nothing but woods down below !*—Open up again quick ; pulling out is no joke with two engines cut. Dutreil goes hot and cold. "Well, where's

Dutreil sweats in his tiny box. Not daring to take his eyes off his instruments, he clutches feverishly at joystick and pedals.



Now he must show what he has learned, in a four-engined Languedoc. Curtains are closed and outboard engines shut off.

With No. 4 engine stationary the Languedoc lands right down the centre of the runway.

Training goes on day and night. Passengers are student navigators and radio operators.

your airfield ?" *Dutreil :* "But . . . I thought . . ." *Instructor :* "You mustn't think. What do you suppose a radio compass is for, and beacon signals ? Just for amusement ? Start again." And he pulls the curtains to again . . .

So training goes on, day and night for months, in all kinds of weather. The passengers he carries are student navigators and radio operators.— At long last he's finished, and his instructor takes him to see the chief pilot for the European region. He is put on to flying cargo from Paris to Algiers. Then he becomes second pilot in a Languedoc, and finally, after a seemingly endless time as "No. 2," he reaches the top—*flight captain* on a regular passenger service . . . *seul maître à bord après Dieu.*

Dutreil is presented to the chief pilot for the European region. He is to fly cargo to Algiers.

At last ! Captain on a regular service. Dutreil hands over his flight plan.

O.K. *Commandant.*

Training Commercial Pilots From Scratch

BY CAPTAIN A. VIRULY, GENERAL CHIEF PILOT, KLM ROYAL DUTCH AIRLINES

A quarter of a century ago it was only natural that commercial pilots should be recruited from the air force. After a brief supplementary training, which usually took no more than six months, they were regarded as fully qualified. With their little single-engined machines they were then assigned to duty on the short European routes—incidentally, there was no night flying at that time. But those days are past and gone. Both military and commercial pilots still control their aircraft by means of elevator, rudder and ailerons ; for the rest, however, their work is almost entirely different. Apart from the dissimilarity of their duties, it is easy to list a number of qualities which may be assets to a military pilot but are most undesirable in a commercial pilot, and vice versa. The word "pilot" has gradually acquired a much wider significance.

The Dutch authorities—among others—have long appreciated these differences. The *Netherlands Government Civil Flying School* forms part of the Department of Civil Aviation, which in turn is under the Ministry of Transport & Waterways, and for many years it has been training Dutch youths straight from secondary school as commercial pilots. In my opinion this shows that the right conclusion has been drawn from the development of two distinct types of aviation,

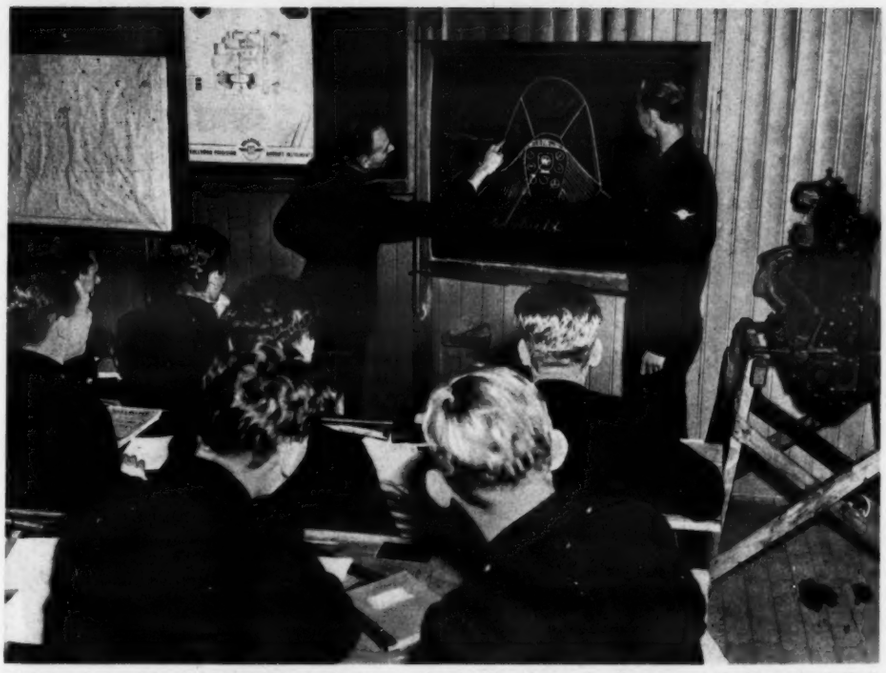
and its effects cannot be other than beneficial.

The results achieved are excellent. Since January 1, 1946, when the school resumed its activities after flying had been completely suspended during the German occupation of the Netherlands, KLM has been kept supplied with young Dutch pilots. Two hundred pupils have now received a full course of training, and I must admit that on numerous occasions I have been most agreeably surprised when a young pilot who had just graduated from the School after 2½ years of training and study made his first long flight as a member of my crew. He might have attended a KLM course in long-distance navigation and also received some practical hints after leaving the Flying School, but it was a pleasure to see him busy at the navigator's table performing his duties as Second Officer.

"What time do we pass 40° West ?"
"In seven minutes, Captain."
"Are you sure ?"
"Yes, sir."
"When are we due at Gander then ?"
"At 10.45 hrs. with 14,500 pounds of fuel—and in twelve minutes you have to alter course four degrees to port, sir."

That's the way to talk ! And it is based on sound technical knowledge. Things were different twenty years ago, when it was perfectly possible to navigate from Amsterdam to Java if one could do three-figure multiplication and division ; before he has even met us, the youthful pilot knows all about the slide rule and the parallax of the moon, the mysteries of cruising charts and the Loran conjuring-box. Again and again one notices it : from the very beginning he has learned to think in terms of passenger comfort instead of stunts, in terms of flight economy instead of disregarding the cost.

I have had them with me, fresh from their School, on flights to New York or places in Europe, and I have often regretted that the Dutch Civil Flying School is not yet an international school, where airmen of non-Dutch nationality could also qualify for the pilot's and navigator's licences of their own country. After all, direct training of this nature cannot fail to benefit every national airline, and from an international standpoint—at least as far as pilot training is concerned—we all have one and the same object, namely, to raise the



Classroom instruction alternates with practical navigation training during the first year at the Netherlands Civil Flying School.

Training in the flying classroom.

One of the Link Trainer Halls at the Dutch Civil Flying School.

Students at the Civil Flying School demonstrate a very Dutch way of eating herring at lunch time. The process is not copyrighted.

international standard of professional knowledge and air safety.

The Netherlands Government Civil Flying School has its Head Office at 3 Kanaalweg, The Hague, while its two main training centres are at Gilze-Rijen, an airfield near Breda, and at Ypenburg Airport, The Hague. The present staff of 298 men includes 25 pilot instructors and 153 technicians. Ground instruction is given at Ypenburg ; its aim is to impart to the trainees the theoretical knowledge required to qualify for pilot's and navigator's licences.

Among the subjects taught are the following : air legislation and regulations (60 hours), engines, fuels and oils (184 hours), meteorology (200 hours), navigation and maps (220 hours), physics (100 hours), radio and radar navigation (140 hours) and aerodynamics (200 hours).

Actual flying training is carried out on a fleet of 65 aircraft, including 23 de Havilland "Tiger Moths," 2 Fokker S 11s, 19 North American "Harvards," 8 Saab "Safirs," 12 twin-engined Beechcrafts and 1 Douglas "Dakota." Needless to say, extensive intruction is also given on the Link trainer. The average number of hours flown by the student before completion of his training is about 280 hours, comprising 80 on the "Tiger Moth," 60 on the "Harvard," 60 on the "Safir" and 80 on the "Beechcraft."

The school has now logged a total of over 80,000 flying hours in the training of Dutch commercial pilots.

It is perhaps worth mentioning how the Netherlands Government Civil Flying School —partly by offering good conditions—manages to secure enough pupils in this small country to meet the needs of Dutch civil aviation. Obviously this is no easy matter, for the secondary schools do not turn out more than 3,300 pupils annually and at least 6% of these must want to become commercial pilots if we are to have the 40 youngsters that we need after the very severe selection tests.

It is therefore important that the costs to be borne by the pupils should be kept extremely low. The entire course (and that includes one year of theory, six months of flying on the "Tiger Moth," and one year on the "Harvard," "Safir" and "Beechcraft," with additional theoretical training) only costs them £360 (about $970.00). The whole amount can be paid in advance, but there is also a scheme whereby the young pilot can repay it out of his salary in the first six years of his service with KLM after completing the course. In return for the above fee, he receives not merely his training but also two-and-a-half years' board and lodging, uniforms, instructional equipment and even a weekly allowance of approximately 25 shillings as pocket money !

On the whole, commercial aviation is very popular in the Netherlands and all sections of the community are very air-minded.

Accordingly, there has never been any shortage of applicants for admission to the School, especially as the pupils could be sure of obtaining employment with KLM on favourable conditions of service after completing the course. It is a typical sign of the times, however, that in recent years the School has had to devote more attention to publicity. The Dutch Government felt it necessary, because of Holland's international military obligations, to call up the pupils of the Flying School for training as reserve fighter pilots, and the idea of a career in civil aviation lost its appeal for many youngsters (and their parents) as a result of the number of fatal accidents with jet fighters.

Nevertheless, the number of trainees has been kept up to standard. I sincerely hope that it will be possible to continue this training scheme. Although the character of commercial flying has undergone a tremendous change in the last 25 years, in my opinion it still offers wonderful opportunities as a profession. The pilot's life is less adventurous nowadays and personal initiative is not as essential in an age of rules and regulations ; it is a question of strict control rather than independent action. But the modern pilot has much more responsible duties of great importance, his job is extremely fascinating, he is well paid, the whole world lies before him.

Perhaps, like the majority of people, I am overestimating the significance of my own profession. But whenever I see a young commercial pilot coming on board for his first trip as an air crew member, I cannot help thinking that this is one more man who can assist in building a wiser world, a world where frontiers are no barrier to international communications. As a Dutchman I am very pleased that within Holland's narrow frontiers there should be enough place for our Civil Flying School. And every time a fledgling pilot on his first transatlantic flight shoots the Pole Star, Arcturus and Vega so accurately that the three position lines almost intersect at a single point, I feel that his training has produced something more than just a promising pilot. For he represents another possibility of plotting a new course to a new world —and is that not a reason for congratulating those who trained him ?

Interview with Heinz

BY FLIGHT CAPTAIN H. ERNST, SWISSAIR'S TRAINING CHIEF

Now or never ! . . . The lad in the bright check shirt and drill shorts walks resolutely across the asphalt parking area towards his target : "me."

At fourteen there is no time to waste. He wants to be a commercial pilot when he grows up and has firmly decided to get the whole thing straightened out with me this very afternoon.

"My name is Heinz Müller. I am 14 years and 2 months old, and a Boy Scout. I shall have finished secondary school in two years. Then I want to learn to fly as quickly as I can. What must I do, sir ?"

He has already pulled a note-book and pencil out of the pocket of his shorts. Nothing has been left to chance ; the whole interview has been carefully prepared . . . Perhaps he really has the makings of a commercial pilot.

Still, it doesn't do to rush things. "You'll have to wait a year or two, you know, Heinz—and then you must become a military pilot before you can be a commercial one."

"Yes, so I've heard," he said sorrowfully. "But my father says there'll be no cash for playing at officers."

"Don't worry about that. Nowadays it's enough to be an N.C.O. In 1951 all of the eight military pilots trained in Switzerland were officers. Today, a year later, only five out of twenty trainee pilots are officers and the other fifteen are N.C.O.'s."

Heinz looked thoughtful : "How long will it be then, before I can join Swissair ? Shall I have to become an engineer first ?"

"That's not absolutely necessary either. But look, I'll tell you what Swissair does want. First you must have done altogether 200 hours of solo flying, that is, without an instructor. Then you mustn't be older than 30—which shouldn't be difficult for you. You must know English well, because you'll hear nothing but English on the R/T. I suggest you put an English dictionary under your pillow every night !"

"Yes sir, I will," he replied in English.

"There, you see, you're doing quite well already. But that's not all. You have an awful lot to learn, some of it interesting, some boring. Even when you're a flight captain, with four broad gold stripes on your cuff, you have to go back to school from time to time. The school-room is then called the lecture hall, but it's just the same really. During the first months of your training you will have to learn all about navigation, the radio service, air traffic regulations, radio-telephony and English (English again, you see), meteorology, electrical engineering, morse, the technical service, aviation medicine, the Link trainer and the flight simulator. And everything else a commercial pilot has to know so that he can take his valuable cargo safely over continents and oceans."

Heinz was very silent. He was obviously thinking that he had no idea what half these subjects were about.

"Don't worry Heinz. You'll make it all right. I only wanted to show you that there's quite a lot to learn. That's because we don't insist on a university education first, and our training is planned for those with secondary school knowledge. But there's nothing to be afraid of. I know you were a bit mystified when I mentioned all those long names. But you'll see ; as soon as the course starts all the mysteries will be cleared up. I shouldn't be surprised if you don't know quite a lot already. As a Scout you know how to find your way in a wood with compass and map. That's what *navigation* is, except that in air navigation you use an electrical radio compass instead of a pocket compass. I'm sure you understand the *morse code* already, and meteorology really means *weather service*. Then it's not difficult to see why you must know something about *medicine*, about first aid, because you are responsible for your passengers. They are not always really ill, you know; sometimes they just feel they need a little attention, and up there in the air there's only you who can give it to them."

"What must I do to become a commercial pilot? . . ." Heinz interviewing Flight Captain H. Ernst, Swissair's Training Chief.

"Yes, I can see that," smiled Heinz.

"So you see, there's really only one hard word left, the *Link trainer* or *flight simulator*. This is a kind of artificial aircraft. It stays on the ground and never moves from where it is, but can be steered like an aeroplane. This is where you learn how to use blind flying instruments and everything that has to do with flying in bad weather."

"And when am I allowed to fly a big plane ?"

"As soon as you've passed your examinations in all the subjects we've been talking about, your flying duties begin. First you are put in a Douglas DC-3 with an instructor, an experienced airline pilot for whom nothing you do is quite accurate enough. But of course by the time you get to the DC-3 you already know how to fly ; you've learned that during your military service. And basically the DC-3 is not much different to fly than a jet fighter. Everything seems heavier and to need a bigger physical effort, but this is only because of the greater weight. Still heavier aircraft need even more physical force. It's like the difference between a heavy truck and your father's baby Austin. When you really get down to it, it all depends on whether you have a feeling for flying."

"What is a feeling for flying ? Where can I learn that ?"

"A good question, Heinz. But this feeling is something that can't be learned. You have to have it in you. It's just the same with car drivers. With some, you feel distinctly nervous, and even the car seems to protest. With others, all goes smoothly and there are no unpleasant jolts for car or passengers.

When you have done your four hours in the DC-3 and made 60 or 70 landings, you start on instrument flying. What you need here is not just feeling but very exact knowledge, a lot of practice and very close concentration on your instruments . . . After another 20 to 30 flying hours you take your blind flying examination and are then sent out as second pilot to experienced captains until you yourself are good enough to be made a Swissair flight captain. And then I will come and fly as a passenger with you because by then I shall have full confidence in you."

From Piston Engines to Jets

Training the Comet Pilots

BY CAPT. E.E. RODLEY, OFFICER IN CHARGE OF TRAINING, BOAC COMET FLEET

It was, perhaps, hardly surprising that, as one of the two BOAC captains appointed early in 1950 to begin the preparatory work for bringing the de Havilland Comet into service, my feelings of anticipation should have been tempered by some apprehension.

The commercial operation of jet aircraft was, after all, an event of the first importance. It was a subject of which we had little knowledge—and that almost entirely theoretical—and so was to be pioneered by BOAC virtually from scratch. The Comet was very much an unknown quantity and, as such, appeared a formidable problem to the pilot of conventional aircraft. However, I found that my apprehension of the difficulties to be encountered had been largely exaggerated.

That is not to say that the transition from piston-engine to turbo-jet flying presents no problems at all or that it is not a process demanding considerable previous flying experience, skill and conscientious application to theoretical and practical phases of training. But, given those essentials and a normal helping of adaptability, the good piston-engine pilot should become a good Comet pilot.

We now have 38 fully route-qualified, operational Comet pilots—22 Captains and 16 First Officers. While I think none would describe his conversion as what we used in the RAF to call "a piece of cake," it is significant that up to the present time there have been no failures to convert to Comet aircraft.

If the teacher is to teach he must obviously himself be taught. In this case, the original flying instruction was by de Havilland's test pilot, John Cunningham, who, in 1950, began to pass on his already considerable experience of Comet flying to the two original BOAC Comet Captains, Capt. A. M. A. Majendie and myself. Under his guidance we gained experience of the aircraft's handling characteristics, performance, cockpit equipment and, to some extent, its operation. I say "to some extent" because the detailed technique for the Comet's operation, especially as it concerned flights over long sectors, had not at that time been finally evolved. It resulted, as is generally known, from the studies of Capt. Majendie and others, and from detailed analysis of the aircraft's characteristics and performance as found in later flights.

With the cooperation of The de Havilland Aircraft Co., who taught us all they knew about their aircraft (or, at least, as much as we needed to know !), we began our own operations with the prototype Comet to learn more of its application to BOAC's own problems of trunk route operation.

With Capt. M. J. R. Alderson, Manager, and Mr. R. A. V. Dismore, Engineering Manager, we formed the nucleus around which the Comet Unit was to grow. The responsibilities of Capt. Majendie and myself were now the building up of the Unit for "operational duties." While he concentrated on the evolving of the operating technique, which included, of course, cruising procedures, flight planning, landing and take-off calculations, emergency procedures and so on, to me fell the task of applying what we had learnt and were now learning to the training of more pilots and other crew members.

Early in the formation of the Unit, it became apparent that we should need the help of specialists in the navigation, flight engineering and radio fields, and three experienced men, Navigating Officer H. E. Smith, Engineering Officer W. Bennett and Radio Officer R. Chandler, joined us accordingly. We now began to take the aircraft further afield.

The flight deck of a "Comet." The crew wear helmets and oxygen masks. Should anything happen to the pressurization system at the "Comet's" operating altitude of 39,000—42,000 ft., the crew must be prepared to take the aircraft down to a safe operating level.

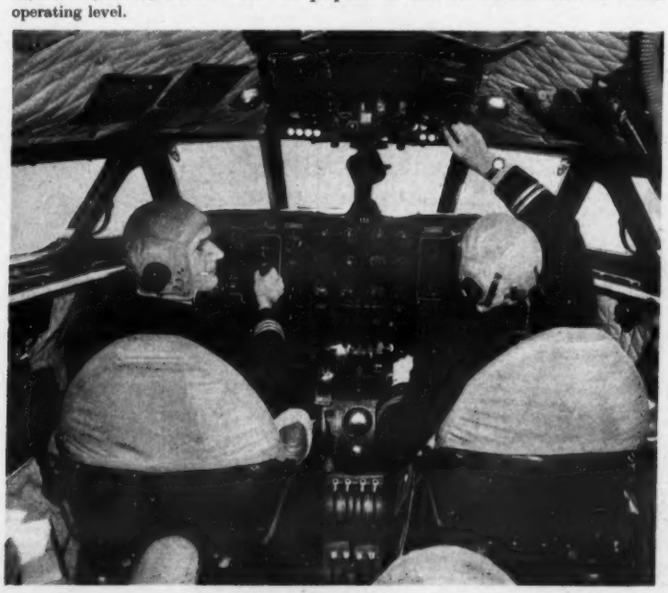
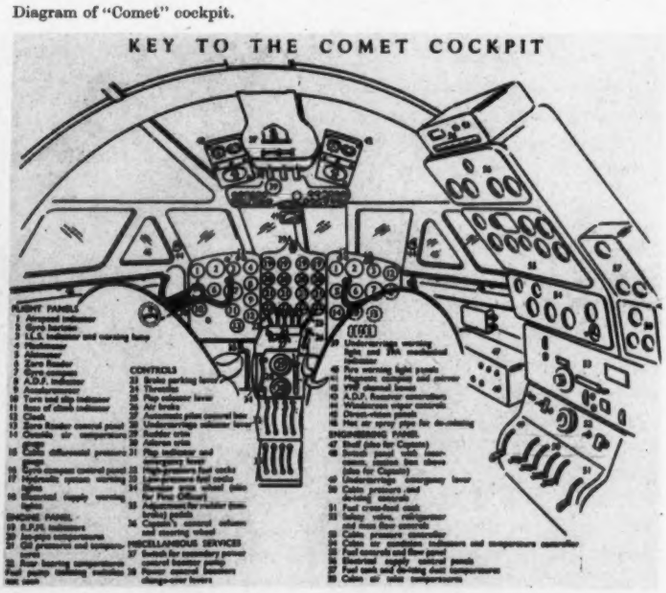


Diagram of "Comet" cockpit.



View from a "Comet" flying over the Alps on a cloudy Spring day. Altitude 39,000 feet.

Flying the Comet—a "pilot's aircraft," we all agreed—from and to "a pilot's airport"—it is not only the British who describe London Airport thus—with its abundance of aids and its (for us) familiarity, could not provide really comprehensive training. Moreover, proving flights were necessary to provide the mass of operational data required, not least concerning weather conditions in the upper air, to confirm the theoretical calculations. These flights, begun on the routes to the Middle East and South Africa, provided this data, together with the opportunities for continuing our flying training under the practical conditions of route operation and at the airports we were to use. In fact, of course, these flights achieved much more besides and the experience gained has proved invaluable.

The proving flights having provided the required data and experience of route airports and alternates, they were succeeded by "route familiarisation" and training flights over the proposed routes. These flights were now specifically planned to provide practical route experience for crews completing training.

The training course for pilot conversion to Comet flying is the same for Captains and First Officers and follows the lines of the early training in that it is a combination of technical instruction by the de Havilland Co. and BOAC's own instructors, local flying training and overseas training flights.

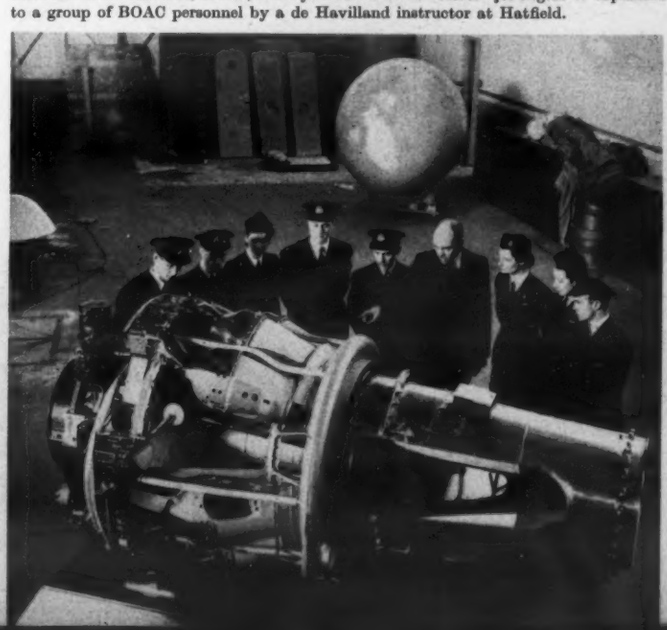
Broadly, it begins with one week's *basic gas turbine instruction* at the BOAC Central Training Unit, at Meadowbank, near London Airport ; *a course of eight weeks with the manufacturers at Hatfield,* studying the Comet specifically ; a further *four weeks at Meadowbank and London Airport for a cruise control Comet navigation course* and for local flying training, and finally a minimum of *two overseas training flights.*

Therefore, the training programme provides for 13 weeks' instruction, excluding overseas training flights. The first 10 weeks are occupied entirely by ground training, with no flying at all. The normal average time from beginning the course to rostering as a fully qualified Comet pilot is about 16 weeks.

The *basic gas turbine course* forms an introduction and a basis for what follows. The subject is dealt with in a general way, without great emphasis on the Comet itself. Lectures cover the theory of jet-propulsion, the development of jet engines, both centrifugal and axial—the

Engineer (left) and Radio Officer at their stations on the flight deck.

"Comet" crews undergo an eight-week course of training with The de Havilland Aircraft Co. at the Hatfield, Herts., factory. Here a D. H. "Ghost" jet engine is explained to a group of BOAC personnel by a de Havilland instructor at Hatfield.



How the undercarriage functions. A BOAC group learn the workings from a de Havilland instructor.

reactions of jet engines to certain conditions, their performance and numerous other aspects of the subject. No special technique is employed other than lectures aided by technical exhibits. The lecturers are staff of the BOAC Central Training Unit.

During the next eight weeks, spent at the *de Havilland Servicing School,* every technical detail of the Comet with which the pilot should be thoroughly conversant is covered by the de Havilland instructors. These fall under six main subject headings—general aircraft construction, hydraulics, electrics, pressurisation and air-conditioning, engines and miscellaneous subjects like oxygen and fire systems.

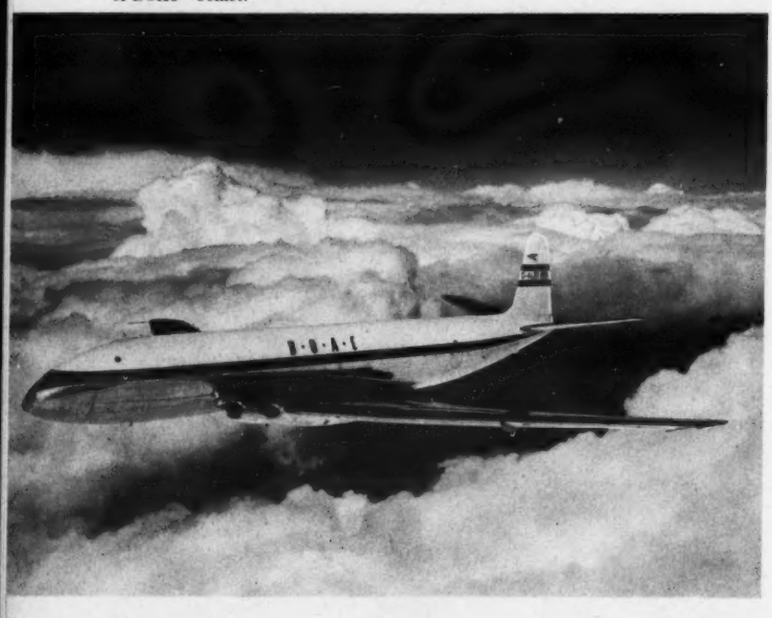
In addition to the lectures, there are visits to the factory to see the production lines and, on the completion of the engine course, a visit to the engine factory and to the test beds. At the end of the eight weeks there is a full day's examination on the lines of the Air Registration Board's examination for type endorsement.

This eight week course is about twice the length of the normal technical course taken by BOAC pilots for type conversion.

From here on the emphasis is on route operating technique.

The next week is devoted entirely to *cruise control,* embracing operating procedures, including emergencies, hold-offs and use of fuel reserves ; flight planning ; theoretical exercises on simulated route flights ; meteorology, largely concerned, of course, with high altitude weather ;

A BOAC "Comet."



and other operational subjects. Attention is given to equipment peculiar to the Comet, such as the Mach meter, and there is a refresher course on the periscopic sextant and the Sperry C. L.2. compass.

All the experience gained on earlier flights is, of course, available to each cruise control course. But, although even now lessons are still being learned from route flying, the basis of the operating technique has needed to be modified so little since our Comet flying was begun, except for changes in methods of data presentation, that the instruction has also remained virtually unchanged.

During the following week we finally get our Comet pilot-to-be into the air. He begins his initial flying training, which involves about 12 hours actual handling spread over three weeks. During the first of these three weeks he completes his Comet navigation course when free from flying duties. After general familiarisation with the aircraft, which includes a climb to 40,000 feet, runs at high Mach numbers, stalling and emergency descents, he is taken by one of the Training Captains through a series of circuits and landings, through instrument and airways procedures and flight emergencies. A Link trainer, which has been fitted with a Comet type instrument panel, is used for familiarisation with instrument layout and Comet instrument procedures ; pilots must prove themselves proficient on the Link before beginning instrument flying in the air.

The initial flying training includes two periods of night flying at light and heavy weights and concludes with a check flight which is designed to test the pilot's ability in every aspect of Comet flying ; instrument ratings are renewed at this time if required.

All that then remains is the successful completion of at least two route training flights under the supervision of a qualified route Captain. A series of these flights is at present being operated between London and Singapore, calling at all the airports used or to be used on the Comet routes to India, Pakistan, Ceylon and the Far East. Not only pilots, but all air crew members completing training are carried in addition to the normal crew. While normal service procedures are observed on these flights and a schedule laid down, no attempt to achieve the block to block speeds of the regular service is made and, in fact, half an hour extra is allowed on sector timings for let-downs to be practised at every airfield.

After a satisfactory performance on his overseas training flights the pilot is rostered for service on the route over which he has flown.

A word about navigation. We are not carrying specialist navigators as such on the Comet, the navigational duties being the responsibility of the pilots. The opportunities afforded by the route training flights for practising the navigational procedures and gearing them to the functions of the other crew members have been invaluable.

I have not attempted to deal here with the specialised training of the radio officer and engineer, in which the emphasis is naturally more on the technical and less on the operational side than in the pilot's training. However, the integration of these officers into the closely knit crew needed by the Comet is of vital importance and this is achieved during the route training flights.

As our experience of Comet flying increases, so we must be prepared to make changes in our methods of operation if we find them necessary. We are to some extent still learning and cannot say with certainty that we have evolved the perfect type of operation.

Neither can we say that we have perfected Comet training. We shall certainly make at least minor modifications to the programme. For instance, the BOAC instructors will probably assume some of the responsibility for the technical training. In the next week or two we are expecting to receive a Comet flight simulator. This has been designed to cope with the special requirements of jet operation inasmuch as complete route sectors can be flown in it whilst every adverse condition and failure can be selected on the "sabotage panel" to the immediate confusion but ultimate benefit of the crew. This simulator is, in effect, a crew trainer, not just a pilot trainer, and so the crew drills and integration, which is part of the operation of the Comet, will have been learned before actual flying training commences. The normal flying let-downs are, of course, simulated, too, and it is hoped that the cost of training will be reduced by its installation, especially as is it intended to use it for periodic check flights as well. Much more time can be spent on a practice in the simulator than in the air and an overall increase of training standards should result.

Nevertheless, I think we can be reasonably satisfied with the progress we have so far achieved. BOAC crews are rightly said to have pioneered the Comet, and training pioneers is a full time job.

Helicopter Pilot School

BY H. BORIS, CORMEILLES-EN-VEXIN

The author, Henry Boris, has 6000 hours to his credit as an aircraft pilot and 400 on helicopters. In 1949 he founded the first helicopter school in Europe, at Cormeilles-en-Vexin. The school has already trained some thirty students, both civil and military, including all the personnel (pilots and mechanics) who use helicopters in Indochina.

Henry Boris, the author.

Up to 1948 the helicopter, in Europe at any rate, had not progressed beyond the experimental stage, and 1949 was the first year in which rotary-wing aircraft were put to practical use. However even then the number of machines in service was so small that no special thought was given to the problem of training pilots or mechanics, except perhaps on a very limited scale.

Events of the past few years, however, have brought considerable progress in the development of rotary wings, and it is not unreasonable to suppose that this progress will continue, in both the military and the civilian domains, during the years to come.

This would therefore appear to be a good moment to examine the problems arising in the training of helicopter pilots and some of the solutions which seem to be the most promising.

Selecting pilots

Opinions on the principal qualities required of a helicopter pilot have been extremely varied. The chief points of discussion are the following : should trainees already have extensive experience as pilots of fixed-wing aircraft ; or should they have had only a beginner's instruction ; or should they have no flying experience at all ?

At Cormeilles-en-Vexin we have trained pupils of widely differing experience, from the seasoned aircraft pilot to the complete greenhorn, via the private pilot and even the glider pilot.

Our experience has been that it is better to convert a seasoned pilot than to train a pupil from scratch.

Although during the first ten or twenty hours of training the student with no previous experience seems to progress more rapidly, and though during the early solo flights such a student, knowing no other reflexes than those learned in a helicopter, will react more satisfactorily in the event of difficulty, once the first twenty hours are passed and it comes to more advanced training, to planning trips and, later, to air work, the seasoned pilot, with his past experience, has a marked advantage over the beginner. He is already accustomed to the look of the countryside from the air, to navigating, using map and compass, judging the nature of the ground when a forced landing is necessary, and meteorological and connected navigation problems are familiar to him. To sum up, his experience of air matters will easily counter-balance the difficulties experienced during the first few hours of training, when he has to control his habitual reflexes.

There are however exceptions, and it has also been our experience that a pupil who has never flown before can acquire all the qualities of his more experienced companion, but this experience has to be paid for dearly, both in flying hours and in risks run.

We have also had occasion to train a number of private pilots with only a small number of hours to their credit, but who had been air observers. The results have been excellent. However, in view of the fact that they were exceptional cases, it is difficult to express an official opinion on such students.

Thus although we would take a seasoned pilot for choice, the latter must realize when he enters a helicopter school that he still has everything to learn and that it is no use arriving like a certain pilot in Texas, already a "millionaire" in flying miles, who presented himself one day at a helicopter school and said, *"I should like to do two or three hours' dual with you so that you can give me the once-over. I have to take a helicopter from New York to Florida tomorrow . . ."* This is just impossible !

Having thus given an opinion of the class of men from whom helicopter schools should select their students, we can now pass on to a consideration of the physical qualities which may be regarded as the most necessary in a helicopter pilot.

As he flies neither very high nor very fast he need not necessarily be a very young man with particularly strong heart, unlike the fighter pilot. What he needs above all is perfect general equilibrium, since flying a helicopter is on the one hand more fatiguing than piloting a normal aircraft and on the other the brain work required of a helicopter pilot is very much more sustained than that of an aircraft pilot.

We have found that it is possible to train excellent helicopter pilots both from very young men as well as from those of more mature age, but that nevertheless the individual's basic training plays an important part. It is impossible to fly a helicopter correctly without understanding why each motion has to be made and instantly deducing the reactions that a given motion will produce in the machine as a whole and in its various parts.

It must finally be recognized that certain individuals, particularly pilots with long experience of fixed-wing aircraft, cannot adapt their reflexes, and we have had several cases where such pilots could not be sent up solo, in spite of twenty-five hours' dual, and had to give up all idea of taking their licence.

Training programme

There are two essential guiding principles for a helicopter school :

1. Training must be regular and progressive ;
2. Theoretical instruction (even for pilots) must keep pace with flying instruction.

During the first few days, flying sessions —two per day—should not exceed about twenty minutes, because the student ceases to assimilate anything after this time. Later the duration of daily flights can be increased to an hour, in two periods of half an hour each, but

Cockpit of the dual control Hiller 360 used for training. Stick : cyclic pitch control ; horizontal lever : collective pitch control, with turn handle to regulate engine output; pedals (to control tail rotor). The most important instrument is a double revs. counter for engine and rotor (second from left, top row). The two toggle switches control carburettor heating and altitude correction. The knobs on top of the joystick electrically control two compensators for lateral and longitudinal stability.

Precision landing practice.

Student learning to regulate the blades of his main rotor.

should never be longer, until the student gets his licence.

It is essential that training should be regular, i.e. that it should not be interrupted for long periods (it is difficult to imagine training a helicopter pilot like some aircraft pilots learn to fly in the aero clubs at the rate of one or two lessons a week). Students must give their whole attention to the training. When they are not flying, an instructor will be explaining to them the mistakes made by their companions at the controls and the methods of correcting them.

But why?, old pilots will ask in surprise. The answer is simple. Not only are a helicopter pilot's two hands and feet barely sufficient for all the motions he has to make, but he must also constantly watch his instruments, particularly his rotor revs. counter, and coordinate all his motions to achieve the manoeuvre he is aiming at.

The object of the first few lessons is to familiarize the student with the various controls.

— With his right hand he actuates the cyclic pitch control which enables him to pilot his machine in the desired direction (forwards, backwards, right, left) and to control the distance so travelled.

— With his left hand he operates the collective pitch control, thus increasing or reducing the incidence of the rotor blades and influencing the helicopter's lift and hence its vertical movements.

— With his left hand he also controls the throttle and hence his engine power.

The speed of rotation of the main rotor must be kept more or less constant. Therefore every time he operates one of the controls (the immediate result of which will be to increase or reduce the power required of the engine) he must also modify the aperture of the carburettor valve to avoid excessive speeding or slowing down of the engine. Too high a speed of rotation would increase the stress on the rotor hub due to centrifugal force ; too low a speed, for a given angle of attack, would cause the blades to stall and lead to loss of control of the machine.

Finally the student pilot has constantly to work with his feet, since the bar controlling the anti-torque rotor enables him not only to turn but also to keep his machine on a given heading. As however the torque is a function of the power developed by the engine, he must correct it every time he operates one of the controls, unless he wishes to see his machine pivot to right or left.

A caricaturist once drew a helicopter beginner as a buddha with several pairs of arms and with one eye looking at the ground in front of him and the other riveted on the instrument panel.

But habits become second nature . . . and what at first appeared a *tour de force* becomes an instinctive routine after a few hours of flight.

It is not our intention here to go into the smaller details of the training programme, but special mention should be made of the subject of hovering. Training in this manoeuvre must begin right from the earliest hours. No student can be allowed up solo until he can accomplish it correctly.

We feel that it would be particularly useful to equip helicopter schools with flight simulators. On the one hand this would reduce expense, and on the other it would enable students with insufficient aptitude to be eliminated before the beginning of a costly flying programme. A first flight simulator for helicopters is being made by Giravions Dorand, and we are following its development with interest.

Problems which have not yet been raised in our helicopter schools include those of instrument flying and automatic pilots. Unfortunately we still have no helicopters fitted with blind flying instruments or automatic pilots, though large American machines, such as the Piasecki, are now coming out in quantity with automatic pilots, and instrument flying (which seemed almost impossible a few months ago) is now a common-place, whether it is a squadron of Piaseckis flying over part of the American continent at night or Sikorskys crossing the Atlantic.

One thing is certain. No helicopter can in future be put into commercial service without such instruments, and it will therefore be essential that schools be supplied within the very near future with the equipment they need to train their students in blind flying.

The instructor explaining how the cyclic pitch control works.

Mlle Andrée Valéry, France's first woman helicopter pilot, taking her final test. She is now on service in Indochina.

Air France engages German Girls

First introduction to the aircraft captain's cabin.

The story begins with circular Ala/Pu No. 3/027-3/032. Under the heading "Charm above the Clouds" Air France's press service announced in June 1952 that five German air hostesses were to be engaged. Applications should be made to Air France's Frankfurt office. Applicants must have charm, good looks, good health, be unmarried and have a good general manner. They must also have a secondary school education, good knowledge of English and French and if possible experience of child or sick nursing. Age between 23 and 35. Height not over 5 ft. 9 ins. Finally it was revealed that the German girls were needed for service on four-engined Douglas aircraft.

Clothes baskets full of letters were received in the Frankfurt office—over 500 applications. The youngest was an apprentice of barely 17, the oldest a doctor's widow of 62 summers.

The list of the applicants' occupations is also interesting. The main contingent came from among young teachers (not surprising ; they are miserably paid in Germany !), followed closely by secretaries and students. Interpreters, fashion models (including one of Berlin's most-photographed "press beauties"), hotel manageresses, a barlady ; not to mention actresses, post office clerks, a hairdresser, a gold worker, an operating theatre sister. There was no women's occupation which had not felt the urge to "higher things."

Air France's German office was looking for *five* German air hostesses ... and had to wade through clothes baskets full of applications.

Knowledge of languages was good on the whole, and most of the applicants were fluent in German, French and English. Quite a number of applicants wrote : " ... since 1945

How would you say "Our aircraft takes off in twelve minutes" in French? One of the applicants being put through her paces.

I have had plenty of opportunity of perfecting my English ..." (... Honni soit qui mal y pense). Unmarried applicants by far outnumbered divorcees and widows. Only one girl was unemployed; all the rest were in work. Several had lived abroad, in Italy, England, France, Sweden. Air France's German office made a short list of 28 names and summoned these to an interview by a mixed French and German commission, which included Air France's chief hostess, Solange Cattry.

Marks were awarded the applicants on the French system, from 1 to 20, with manner, knowledge of languages, charm and general education playing the decisive part. The best of the twenty-eight got the mark 17,14.

The five applicants finally selected—Margot Wirges, Ruth Kamphausen, Dorothea Mosenthien, Barbara Spendel and a Swiss girl, Rosi Rudin—next had to undergo a medical examination (in particular of the respiratory organs, circulation, visual acuity and colour vision), and then the course of instruction, directed by Chief Hostess Cattry, began. First there was the theoretical side and then training in the air. On August 1st work began in earnest, with 95 flying hours a month on the Frankfurt-Berlin, Munich-Berlin and Nuremberg-Berlin routes—all domestic German runs.

At Air France's Frankfurt office they are particularly satisfied that applicants for these posts were actuated rather by idealism than by financial considerations. None of the girls had "romantic notions" about the job, and all applied with their eyes open, although only one of the five hundred came of a flying family. None of the others had any connection whatsoever with aviation.

More than one of the letters received raised an amused smile. One applicant wrote under "occupation" : "Fräulein with the Army of Occupation."

An enterprising young lady from Berlin who had read the advertisement for "sky brides" in the paper, wrote the following letter :

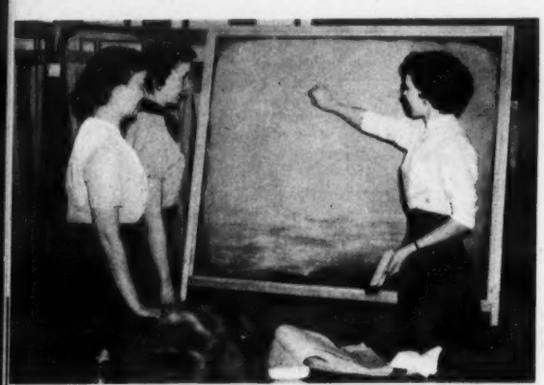
"The undersigned would very much like to be a 'bride.' Everything your newspaper item says you want in hostesses for Air France applies to me—or don't you think so ? There is only one snag. I did not see the light of day until May 4th, 1931. Am I not 'airworthy' enough for you at 21 ? Must I really wait another two years before I can fly ? My picture can easily be detached, and I am sure you will want to send it back to me if there's no chance of my landing and taking off with you, because then I shall have to look for another landing ground. Still, it would be nice to be a 'sky bride' with Air France. With best regards, Susi S."

Commercial Air Training

How to Become an Air Hostess

At Kansas City, TWA's headquarters, a Hostess Instructor takes a group of future air hostesses through their book work at the beginning of their four-week course. Classroom subjects include food service and serving procedures, airline and aircraft terminology, flight routine, baby care, etc.

First-aid instruction comes in for its share. Here an instructor supervises the proper technique of fitting an arm sling.



Learning the intricate functions of air conditioners, pressure regulators, heating units. An instructor explains the working of the pressurization system.

Trans World Airlines, then still known as Transcontinental & Western Air, Inc., began to employ air hostesses 17 years ago, partly as an experiment. They stayed, and today the airline has more than 600 hostesses to look after the comfort of its passengers on its 32,000 miles of routes.

What does it take to become an air hostess ? Besides those indefinable talents any hostess, airborne or grounded, must have, it also takes the skills of a mistress of ceremonies, librarian, tourist guide, cateress, travel adviser, ticket collector, fourth at bridge or second at gin rummy.

Applicants for employment as air hostesses with TWA must be between 5 feet 2 inches and 5 feet 7 inches in height, between 100 and 135 pounds in weight, depending on height. Some college education, nurse's training or a suitable combination of education and business experience is required. A pleasing personality and neat appearance is considered more important than beauty or glamour. All applicants must pass a physical examination.

During her four weeks at the Kansas City hostess school, the student hostess goes to classes to become familiar with the line's food service and serving procedures, airline and aircraft terminology, flight routines, procedures for tickets, and reservations. She learns how to care for infant passengers and children, how to make out certain forms and reports. She studies the routes and schedules of her own and other airlines so she may be able to advise passengers properly. She also learns the points of interest on TWA routes and how to point them out to passengers over the public address system on the aircraft. A course in simple first aid is included.

She also studies the design, characteristics and performance of the types of aircraft in her company's fleet—the "Constellation," the Douglas DC-4, and the new twin-engine Martin 4-0-4's which the airline is using on its medium and short-haul routes in the United States.

A most important lesson is the location of all the interior equipment and supplies on each aircraft and the functioning of the hostess panel.

Another part of her course is devoted to personal appearance and good grooming, for she must present a neat, attractive appearance at all times while on duty.

Oral and written examinations are given ; at the end of her course she and her classmates take a two-hour flight during which they must pass inspection by doing in actual practice all that they have learned in the classroom.

Kansas City is not the only hostess training school operated by TWA. As vacancies in the ranks of hostesses flying on TWA's Atlantic routes occur (there is a turnover of about 5 per cent a month of hostesses who resign to be married), hostesses on United States routes may apply for these positions on the basis of seniority. Before going on the trans-Atlantic routes, these hostesses take a short period of training in New York to familiarize themselves with procedures on TWA's trans-Atlantic and international flights, such as meal and beverage service, instruction in the entry forms required by various countries, and international customs and courtesies. Most TWA hostesses desiring to apply for the trans-Atlantic routes prepare themselves by studying French or Spanish.

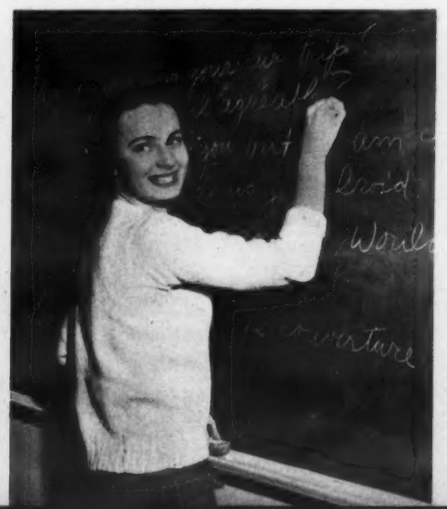
Nationals of European countries are employed as hostesses on TWA's routes through Europe, North Africa, the Middle East and India. Most of these young women are of French, Swiss, Dutch or Scandinavian extraction. They are trained in classes held in Paris. Requirements are the same and their course of training is the same as that given in Kansas City except that the emphasis is on the airline's international routes. These young women are also required to have a knowledge of both French and English and most of them also speak and understand several other languages.

Of TWA's 600-plus hostesses, more than 60 fly the trans-Atlantic route on standard-service flights, low-fare tourist flights and the luxury all-sleeper flights. About 12 international hostesses are based in Paris.

The hostess is a hard-working member of a hard-working crew. But if her work is

Personal appearance is a "must" subject. Cosmetics, yes—but not too much and not too little. Incidentally, girls who *don't* dye their hair are given preference over those who do !

Hostesses on international routes must have at least a smattering of foreign languages. They learn mostly French and/or Spanish.



Out of the classroom into the food kitchens go the trainees as they see how TWA's food service is prepared.

demanding, it is also rewarding. The highly-prized advantage of travel, for example, is all in a day's work for the airline hostess. She visits important cities and new countries, and visits them often enough to learn something about them. One of TWA's international hostesses, May Boyle, of Philadelphia, has earned a reputation as a travelling scholar. Specializing in languages, she has studied (between trips) in Rome, at the Sorbonne in Paris and at Columbia University in New York.

Fire equipment drill : learning how to use a fire-extinguisher.

After four weeks, fledgling air hostesses are given their uniforms and begin putting their newly acquired knowledge into practice. To start off with, they go on a two-hour "shake-down" flight. Above, a student makes the "welcome aboard" pre-flight announcement from the front of the cabin.

The hostess is instantly notified when a passenger presses his individual button and must be ready to take care of his needs.

At the rear of the cabin an instructor gives a group of the girls a final check-out on the hostess panel. Buttons, switches, knobs and lights studied in classrooms now take on real meaning.

There is a certain way of doing everything, even the folding of a blanket. All along the aisle during the shake-down flight the new hostesses are placing and replacing pillows, folding and unfolding blankets.

Every hostess must know how to administer oxygen. Here an "airsick passenger" gets the treatment from another acting hostess, under the watchful eye of an instructor.

Food preparation. Forward in the cabin others are taking turns setting up food trays, serving them to their "trainee" passengers and in turn sitting down to be served by the next new hostess.

Back on the ground comes the climax of four weeks of training—the silver wings, the emblem which changes a trainee into a full-fledged air hostess.

Hostesses flying TWA's international services receive inoculations and injections against diseases that may be prevalent in areas which they traverse.

On her own. An air hostess looking after young passengers on an Atlantic flight.

Flight Simulators . . .

"fly" like aircraft

Not so long ago anyone who maintained that flying could be learned largely on the ground would have been laughed at by all the exponents of the art.—"Flying," they would have said, "can only be learned—if at all—in the air, and it takes hundreds or even thousands of hours . . ."

But today, since electronic flight simulators have been invented, it is generally recognized that it is *cheaper and better* to spend half the time, or more, on any kind of *conversion training* (e. g. from DC-3 to DC-4, or from DC-4 to DC-6, etc.) *on "dry land."* That this method is cheaper is immediately clear, as flight simulators "fly" (take off and land) without fuel and without risk of crashing.[1] But why better ?

Because these machines enable pilots and whole crews to be drilled in *dealing with emergencies* to which neither costly machines nor human lives can be deliberately exposed. From a simple drop in oil pressure reading, carburettor icing or ignition trouble . . . up to failure of the control boost, a jammed undercarriage, severe icing-up of the wings, even the particularly tricky uninitiated reversal of propeller pitch—virtually all technical hitches and combinations of hitches which may plague a pilot's life—can be simulated. Highly dangerous situations, such as are not encountered more than once in a twenty-year flying career (and preferably never), can be reproduced as often as required within a few minutes, until the crew has lost all fear of them and is quite equal to tackling them.

Today there are flight simulators—like aircraft—in all sizes and of many different types. Strictly speaking, even the old-style rotating *Link Trainer,* which is still used for general instrument training of countless pilots throughout the world, is a flight simulator, though a mechanical one. The more modern electronic machines, such as for example the *instrument flight trainers* made by Curtiss-Wright, Link and ERCO (see pictures), are much more complicated. In addition to the normal blind flying instruments, they are always equipped with a number of radio aids (in particular with ILS), and with a mechanical-electronic control force simulator. Because of weight, size and cost considerations, rotation of the pilot's cabin, which in the old Link trainer provided an additional sensation of acceleration and realistically supported the readings of the turn and bank indicator, has been done away with. Pupils apparently get the required impressions from control forces and optical and acoustic observations, and do not miss the rotating motion . . .

Let us first look at an electronic blind flying trainer, used for the training of the pilot only (not the whole crew). The example chosen is the Curtiss-Wright Corporation's *Dehmel Model 400* instrument flight trainer. This is a stationary trainer of a general type, which however can be largely adapted to certain definite aircraft types (including helicopters) as far as "engine power," "maximum and minimum speed," etc. are concerned. Flying attitudes, airframe and engine settings are reproduced "true to life" as control forces and instrument readings.

The equipment consists of six basic elements : 1. generalized *single-seater cockpit* with the usual controls and blind flying instrumentation, ILS indicator, headphones, microphone ; 2. *electronic computer* for continuous evaluation of flight movements (differential equations) and providing appropriate readings on the instruments ; 3. *control loading mechanism* to reproduce control forces ; 4. *instructor's trouble panel* (also known as "sabotage panel" or "Maddening Maria"), with the aid of which instruments can be made to fail or engine trouble, etc. simulated;[2] 5. *power supply* ; 6. *automatic radio aid unit with recorder* for the simulated flight track.—The radio navigation aids that can be simulated are MF radio range with VHF markers, automatic radio compass with homing receiver (audible signals), ILS beacon and VHF two-course radio range. The instructor can also reproduce wind forces of from 0 to 120 knots from any direction, vary sea level pressure between 28 and 31 inches and set airfield altitude between 0 and 5000 ft.

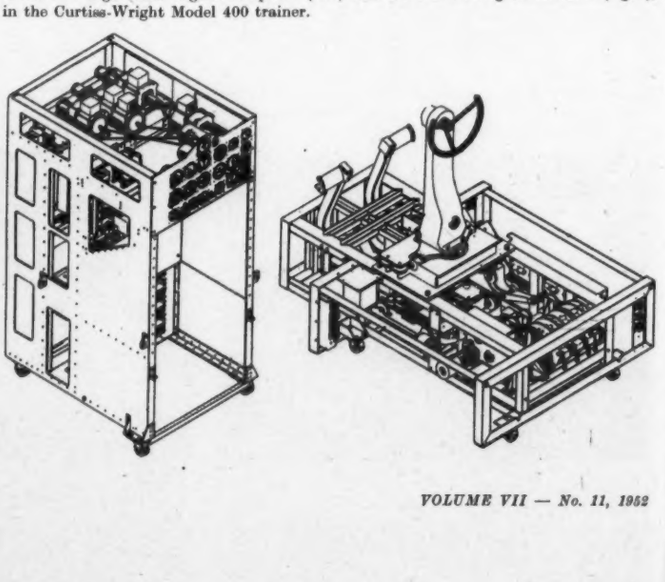
Another general trainer, specially designed for the U.S. Air Force's jet fighter pilots, is the *Jet Flight Trainer C-11A,* made by Link Aviation Inc. (Binghampton, N.Y.). This is

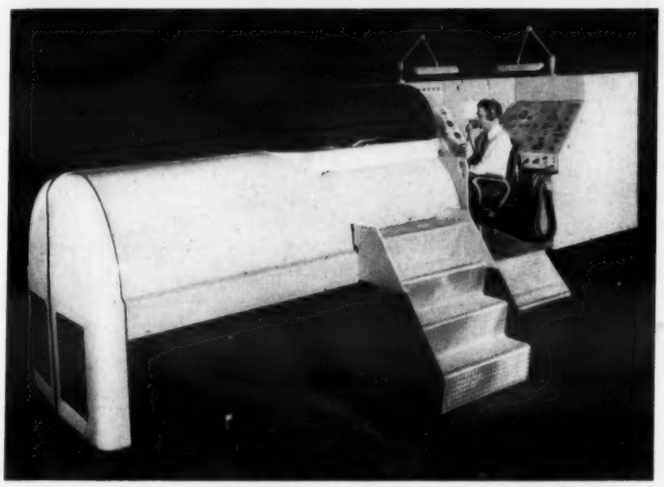
[1] Whereas the direct operating costs of a four-engined commercial transport are $350 to $700 per hour, the hourly cost of a Dehmel flight simulator for a complete crew (with purchase price of $750,000 spread over 20,000 hours) is only $67.50. Another substantial factor is the loss in revenue (approx. $1500 per hour), as an airliner which is being used for training naturally carries no paying passengers.

[2] For example, if the instructor sets "carburettor icing," and the pilot fails to watch his intake air thermometer or to switch on the carburettor heating he automatically loses "engine power" until he gets a complete "engine failure."

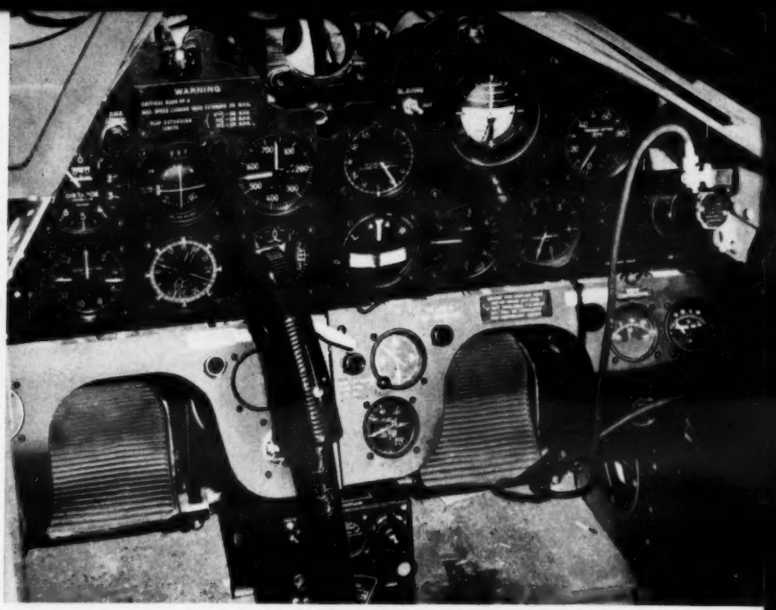
Curtiss-Wright Model 400 flight simulators (patented by Dr. R. C. Dehmel) in mass production : Left, checking the radio aid unit (with recorder) before final assembly. Above and behind this unit is the sabotage panel, and to the latter's right the power supply unit.

Electronic flight and engine computer (left) and control loading mechanism (right), in the Curtiss-Wright Model 400 trainer.

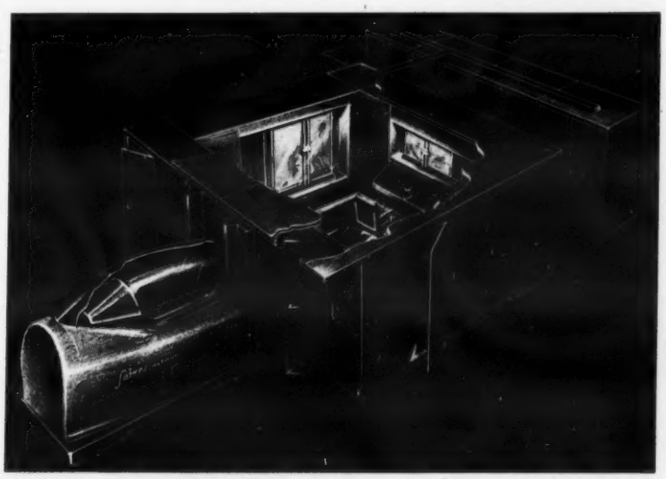




The C-11A jet flight trainer made by Link Aviation Inc. is used for training U.S. Air Force pilots.



The instrument panel in the jet instrument trainer. *Top row* (left to right), DME, course indicator for ILS or VOR, air speed indicator, gyro compass, gyro accelerometer, radio-magnetic indicator for VOR, altimeter, turn and bank indicator, climb indicator, exhaust temperature.
Extension panel : chronometer, fuel gauge (right of joystick), cabin temperature, ambient air temperature, amp. meter (on right-hand cabin wall).



Sketch of ERCO's jet flight trainer for the F-86D "Sabre" all-weather single-seater fighter.

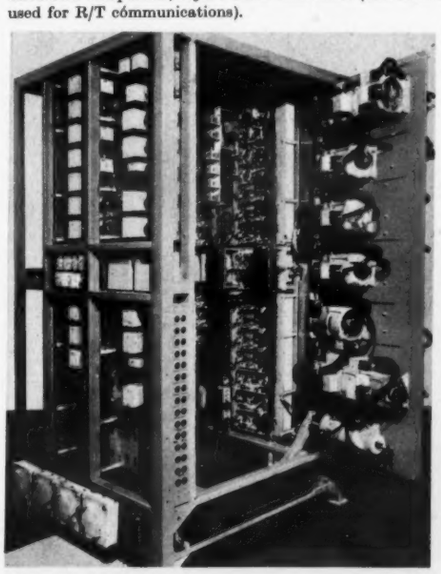
Dehmel flight simulator for training the three-man crew of the Boeing C-97A "Stratofreighter." Picture shows two pilots, with flight engineer behind, and, in foreground, the instructor with his sabotage panel. During training crew and instructor are separated by curtains.

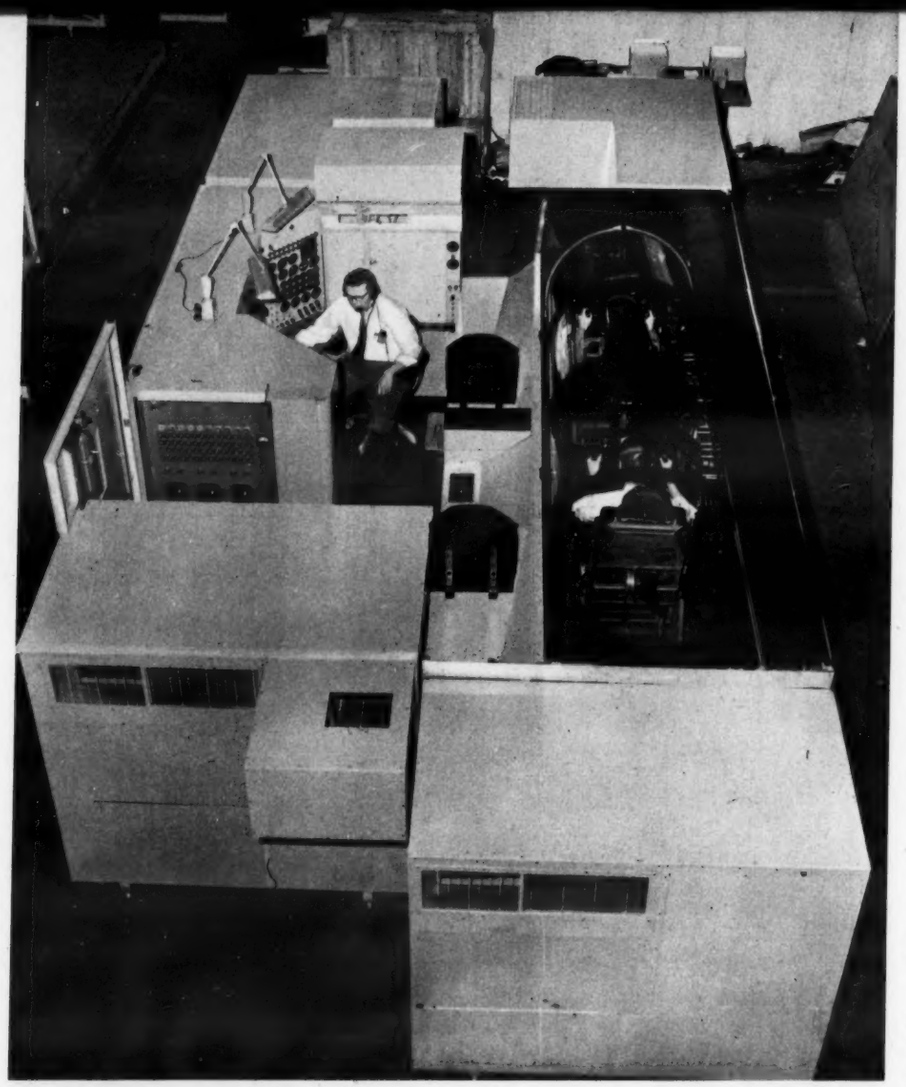
also in quantity production. The arrangement of the instruments, control forces, "flying qualities" and limit speeds correspond roughly to those of a Lockheed F-80 (or T-33) "Shooting Star." This simulator also has a trouble panel. Coloured lights tell the instructor immediately when his pupil makes a mistake.

For the U.S. Air Force and Navy's most important jet fighters—the F-86 "Sabre," F-89 "Scorpion," F9F "Panther," F3D "Skyknight," etc.—specialized flight simulators have been created, which correspond to the basic type in every detail. One example is shown in the picture of the *Instrument Flight Trainer* for the *F-86D "Sabre"* single-seater all-weather fighter, made by ERCO (Engineering and Research Corp., Riverdale, Md.).

For the training of whole crews, i.e. two pilots and flight engineer, considerably larger equipment is required, such as the *C-97A-Simulator* (Curtiss-Wright) and its British licence version *Type C.700* (Redifon Ltd., London) shown in the pictures. These machines are used not only for training crews on

Details of the Redifon Type C.700 flight simulator for the Boeing "Stratocruiser" (Curtiss-Wright license). *Left :* electronic computers ; *right :* radio aids units (one each for departure and arrival base) and instructor's panel (also used for R/T communications).





an aircraft which is new to them ("Stratocruiser" or "Stratofreighter") but also for regular checking of training standards during flying service.

The triumphal progress of jet propulsion, in bombers and in commercial aviation, has also led to the design of specialized flight simulators for specific large jet aircraft. One example is *Link's B-47B trainer*. Both pilots are trained here simultaneously, and the particular characteristics of the "Stratojet" are simulated so exactly that allowance is made not only for the special take-off (JATO) and landing technique (pushing down against the runway and brake parachute) in this aircraft but also for the alteration in centre of gravity as fuel is consumed and bombs released, for aileron reversal at high speed and even for re-fuelling in flight. Normally the crew flies its simulator in exactly the same way as a real "Stratojet": flight plan, pre-take-off check, instrument take-off with JATO, *check,* cruising flight, *check,* in-flight refuelling, *check,* target approach, *check,* cruising flight, *check,* landing approach, *check,* instrument landing, and yet another *check.* (50% of a pilot's job today seems to be taken up by checks.)

In addition 65 different dangerous situations can be simulated. The equipment weighs 16,000 lbs. and covers an area of 280 sq.ft.

A flight simulator is also being built for the world's first jet airliner, the de Havilland "Comet."

Link's flight simulator for Boeing B-47B "Stratojet" crews. The roof of the installation and the black curtain which normally separates crew from instructor have been removed.

Biggest Jet Flight to Europe

Sixty-three North American F-86E "Sabre" jet fighters—built under licence by Canadair Ltd., of Montreal—stand ready at Uplands Airport, Ottawa, for their mass flight to Europe. Sixty of them left at the end of September for Gros Tenquin airfield, near Metz, France, as the first Royal Canadian Air Force wing to be stationed on the European continent. Three formed the vanguard of a large number of "Sabres" ordered from Canadair by the Royal Air Force. In the lower part of the photo the crews can be seen lined up in front of the control tower. Three RCAF squadrons, each of about 20 aircraft, are already stationed in Britain. As soon as the RCAF's air strength in continental Europe reaches 240 fighters, they will join the other squadrons to form the Canadian First Air Division under NATO Air Force Command, Central Europe. Because of the "Sabre's" limited range, the mass flight of the 63 aircraft was scheduled via Labrador, Greenland, Iceland and Scotland. By the time these lines appear in print, the aircraft will be firmly installed in France.

Training Air Traffic Controllers

In these days of incessantly growing air traffic density, the training of the men who regulate the movement of the aircraft, namely, the air traffic controllers, radar controllers and airways controllers, becomes a subject of vital importance. To provide an adequate supply of such personnel, Britain's Ministry of Civil Aviation has been operating a special school for several years. The *Air Traffic Control School* is at Hurn Airport, Hampshire, and it runs courses for the three classes of officer mentioned. The Air Traffic Control Officer is the basic "trade," the other grades being obtained afterward by qualifying from the other courses. The simplest way to present a clear picture of the working of the school is to outline the requirements and its syllabus.

The School's first duty is to train personnel for Ministry of Civil Aviation aerodromes and control centres. Applications are invited from men between 23 and 35 years of age who have been pilots or navigators, preferably with some air traffic control experience, either civil or military. Each candidate has to pass an International Medical Examination at the RAF Central Medical Establishment, after which he is offered a probationary appointment as an International Air Traffic Control Officer, Grade III. On accepting, the candidate is posted to a MCA aerodrome for two weeks, where he gets a general knowledge of procedure and atmosphere and has time to bring the amendments in the formidable sheaf of documents he is issued up to date—this task in itself is reckoned to take a week !

The trainee is now ready to start his eight-week Primary Air Traffic Control Course at Hurn. First he receives an introductory lecture from the Superintendent of the School on the history of Air Traffic Control, the Ministry of Civil Aviation Air Traffic Control Officer training scheme, the Hurn school and the certificates to be earned. Then follows a short series of basic lectures on the organization of ATC. This explains, among other things, the differences in the Royal Air Force, Royal Navy and Ministry of Civil Aviation systems ; ICAO, in history and practice ; aviation law ; the duties and responsibilities of ATC officers in aerodrome and approach control and at air traffic centres ; and the work of the Oceanic Area Control Officer. Next follows a talk on the documents and publications essential to this calling.

After this the lectures become more detailed and the trainee is taught the meaning of all his technical terms and the classification of aerodromes and all details of their working, from the dimensioning of runways to the marshalling of aircraft. The theory of aerodrome and approach control are next covered in detail, taking no less than twelve hours of lecture time.

Shorter lecture periods are sufficient to give the general picture of the ancillary work of the Flight Information Service, the air traffic control centres and the search and rescue organization. The fundamental subject of the rules of the air and air traffic control is divided into several lectures—lasting six hours in all. Individual two-hour lectures follow on flight plans ; ATC movements messages ; radiotelephone techniques and procedures ; controlled descent through clouds, including the military system, radio-telephone patter and the limitations of the procedure ; wireless-telegraphy and the "Q" code. This spell of lectures is concluded with a summary of the control organizations on the Continent and in Ireland, as well as some further details on oceanic control.

Having been instructed in the direct aspects of his work and the more immediate background organization the pupil is now given lectures about the working of surrounding organizations and the equipment he will encounter. The Aeronautical Information Service, aerodrome lighting and the characteristics of the more common transport aeroplanes are explained in three two-hour lectures. Administration, customs, immigration, liaison with the military authorities in searchlight practice, army cooperation and balloon flying and other general subjects complete this preliminary phase of training.

Few of these subjects studied are very profound and most follow logical sequences of thought, but the sheer bulk of knowledge that must be learned is formidable. It is true to say that an average intelligence and a good memory are of more use to a Traffic Controller than just a brilliant mind. After absorbing the theory of his work the student is given four specialised courses : the first, or *Practical Course,* teaches the student the technique of using radio-telephony, including voice control procedures and phraseography. This is followed by actual practice in aerodrome and approach control under VFR (Visual Flight Rules) and IFR (Instrument Flight Rules) conditions. Hurn tower is visited and practice is given in laying out strip markers

Northolt Airport Control Tower : the combined Aerodrome and Approach Traffic Control Desk. At the extreme ends the Aerodrome and Approach Controllers are seated ; in between them all their respective Air Traffic Control Assistants. The Aerodrome Controller is in the foreground working at his Flight Progress Board.

The Approach Controller checks the bearing on an aircraft on his Cathode Ray Direction Finding Equipment.

and in the use of pyrotechnics. Although simple to describe, the time taken on this work is actually longer than the previous lecture period.

The next course is on *Navigation* and involves the aspects of navigation which a Controller must understand in order to carry out his duties—in other words, a syllabus roughly similar to that taken by a commercial pilot. Since applicants for the British certificates are all ex-pilots or navigators this period is really a refresher course and only lasts about four days.

Signals (i. e. telecommunications) form the next main subject. The subject is viewed from the operational side, not the technical, and is intended to provide the would-be controller with a knowledge of the uses of signals to assist the navigation of the aeroplanes under his control. The schedule of lectures deals with all the systems of radio and radar aids, and films are used to assist instruction.

Meteorology is the subject of a short refresher course, and the student is given a clear picture of the organization and services available. Practical exercises in the making of observations and the use of information take up the greater part of this period.

Having been given this thorough grounding in his work, each student is then posted to an MCA aerodrome to gain experience in the application of his knowledge under the immediate supervision of an Air Traffic Controller. A minimum of thirty days is laid down for this, and usually two to three months is required before the issue of a Provisional ATC Certificate is recommended. This Certificate allows the trainee to continue working under general supervision at his aerodrome until he is ready to take his qualifying examination. Again a minimum period of familiarisation is laid down, namely, six months, but in practice nine months to a year are usually needed to absorb the many facets of the work to the point where reactions become automatic.

The qualifying examination consists of two written papers, a practical test on a synthetic control installation, and an oral examination, in which the student is cross-questioned on the subjects in which he has proved weak in the previous examinations. If successful, the trainee will be rewarded for his fifteen months to two years of study with a Controller's Certificate endorsed with Aerodrome and Approach Control ratings. A Controller's Certificate has to be endorsed specifically for each aerodrome to which he is attached.

A detailed view of the Approach Controller's Flight Progress Board.

Radar controllers are chosen from among the ranks of qualified Air Traffic Control Officers or else have to qualify as such before taking the eight-week course for GCA Controllers and Traffic Directors. The instruction here is very much concentrated because of the nature of the duties, and the maximum size of a class is two GCA Controllers and six Traffic Directors, this limitation being set by the number of pupils who can use the equipment at any one time.

The course is mainly a practical one, only the first week being devoted entirely to lectures. The elementary principles of radio, radar and the cathode-ray tube are explained by lecture and film, followed by lectures on and demonstration of the GCA Search (Plan Position Indicator = PPI) and Precision Systems, the siting of GCA vans, operating, and R/T procedures. After this, most of the students' time is taken up with practising the use of the equipment. However, to keep pace with the work, further study is essential and a syllabus is laid down for each of the remaining seven weeks, which is filled in when the student is not actually in the truck or using the synthetic trainer and in his own time in the evening.

The practical training is an expensive item, since the only way to learn thoroughly is to use actual aeroplanes. No less than 224 aircraft hours and 147 Link or synthetic trainer hours are required for each pupil. The MCA aeroplanes used are mostly Airspeed Consuls and Avro XIXs, with an occasional de Havilland Dove. The GCA equipment (which, it may be recalled, was a British invention handed to the U.S. for manufacture during the war) is of the Federal type : the Services use Bendix sets.

The instruction of GCA Controller and Director is complementary ; the Director deals with the general directing of the aeroplane once it is within range of the aerodrome's PPI equipment, while the Controller brings the pilot down the glide path to the break-off height. The Director must be able to take over from the talk-down controller in the event of an equipment failure or other emergency, so although his work is less detailed, he must understand the other man's job.

The seven weeks of practical instruction—some 90% of which is done with actual aeroplanes—is divided into two phases. In the first the GCA Search System (PPI) is used with a single aeroplane making training circuits, being identified by a turn, positioned and brought in on a PPI approach. This is followed by a talk-down approach on the GCA Precision System. The second phase is carried out with several aeroplanes in order to teach the students the drill for identifying and positioning aeroplanes into a pre-arranged landing rate and several talk-downs in succession. Emergency procedures, including talk-down without elevation information, are covered in this phase. During this period any other aeroplane flying into Hurn is brought into use, and even the Vickers "Valiant" bomber prototype has been incorporated into the pattern on several occasions. In order to ensure that each trainee sees the *whole* picture, he does 28 hours as safety pilot in the aeroplanes being brought in by his fellow-students.

During the fourth week of instruction the Superintendent carries out a flight check with the Chief Radar Instructor supervising in the truck. At the end of that week, and at the end of each subsequent week, the instructors make an individual assessment of each trainee's ability. Upon these assessments depends the continuation of each man's instruction. The recommendation for the issue of a rating by the Superintendent of Air Traffic Control is then subject to the pupil's performance in a written examination, a stiff practical test and an oral board.

To qualify for the senior posts of Airways Controller or Assistant Airways Controller, ATCO's attend a six-week course at Hurn. In this case up to ten men can be taught at a time. They spend a week on theory and thereafter study the special radar displays used in connection with Britain's complex airways system and practise on a simulator where different students act as "aircraft" and controllers. Density of pattern is gradually built up in these exercises until the students are handling the number of aircraft met with in normal airways operation. After one or two months supervised experience in an Airways Control Centre, the student is boarded and if successful, receives his rating.

The MCA School at Hurn is run on public funds and it was authorized primarily for the training of officers who would be employed in Britain, but any vacancies are open to men sponsored by overseas governments. Fourteen European nationals, six Belgians, six Swiss and two Germans took a special Airways course in October. Danes, Dutch, Belgians, Swedes, Finns and Norwegians have already been trained—in general countries where English is the first foreign language—come for assistance. Hurn maintains close liaison with the French ATC School in Paris. Eastern and colonial students come in considerable numbers, East Africans, West Indians, Indians, Sudanese, Pakistanis, Lebanese, Egyptians and Israelis have all been accepted for the Primary Course.

In the first six months of this year there were 25 primary, 31 general airways, 29 radar and 7 elevation tracker (GCA assistants who give heights to the controller) students, of whom no less than 48 came from overseas.

J. H. S.

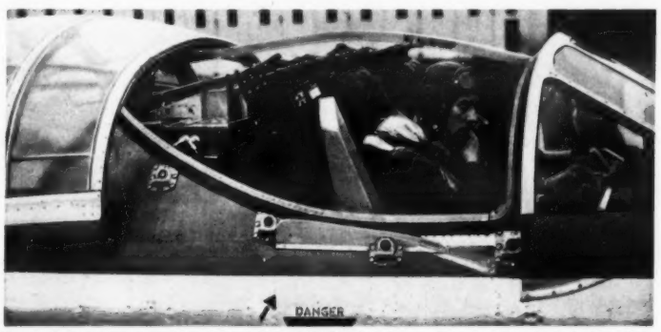
Fokker and Fairchild sign Licence Agreement

British interest in the Fokker S-14 "Mach Trainer" : Air Marshal Sir John N. Boothman (in uniform), Controller of Supplies (Air) at the British Ministry of Supply, about to board the aircraft for a trial flight with Fokker's Chief Test Pilot, Major Sonderman (far left). Second from left is Mr. Vos, Managing Director of Fokkers ; second from right Chief Designer Van Meerten.

In the middle of July the wire services reported that the *Fairchild Engine & Airplane Corporation,* of Hagerstown, Md., had bought the manufacturing rights to the Fokker S-14 two-seater jet-propelled advanced trainer, now officially named the "Mach Trainer," from *N. V. Koninklijke Nederlandsche Vliegtuigenfabrieken Fokker.* The report proved premature, but at the end of August the two companies announced the conclusion of a much broader agreement.

Under this agreement, Fairchild is given the option to all manufacturing rights in the United States for Fokker's current products. These include not only the Fokker "Mach Trainer" but also the S-11 and S-12 primary trainers and the S-13 twin-engined crew trainer. An S-11 and S-12 have meanwhile arrived at the Fairchild plant for demonstration in the USA. In addition, the agreement covers the projected Fokker F-27 twin-turboprop transport, christened "Friendship" in the passenger and "Freightship" in the cargo version, which—with a passenger capacity of 20 to 30—is regarded by Fokker as the long awaited replacement for the Douglas DC-3. The two companies have agreed to cooperate very closely in the development of the F-27.

Fairchild will also handle the sales organization for all these Fokker types in the United States. At the same time, Fairchild has granted the European rights of sale, repair and service of its own products to Fokker so far as this is practicable. At the present time this seems to apply only to the Fairchild C-82 and C-119 "Packet" transport aircraft used by the USAF in Europe.



General Aler, Commander of the Royal Netherlands Air Force, prior to taking off in the S-14 for a trial spin.

While the Dutch Government has placed an order for 20 F-14 jet trainers, no contract has so far been awarded by the USAF. But the agreement marks the restoration of direct relations between the Dutch and American aircraft industries. In 1928 Anthony Fokker, founder of the company, went to the USA to create the Fokker Aircraft Corporation with the assistance of American capital. This company—of which "Dutch" Kindelberger's huge North American Aviation Inc. is a direct descendant—was given all manufacturing rights to Fokker's earlier products. Later on, another liaison with the U.S. aircraft industry developed when the Fokker company acquired licences for the Douglas DC-2 and DC-3 transports, but these types were never built in Europe.

Design work on the "Mach Trainer" began in 1948, at a time when precise specifications—based on actual experience—for such a trainer were not yet available. However, the high rate of jet fighter accidents spotlighted the need for such an aircraft. The S-14 combines relatively high cruising speed, good manoeuvrability and low landing speed and thus fills the gap between the slower propeller-driven trainers and high-speed jet fighters. Furthermore, the S-14 is easily adaptable for ground-strafing and rocket firing training.

Since it was first exhibited at the 1951 Aircraft Show the "Mach Trainer" has aroused much interest in the USA—as the Fairchild agreement shows—and in some of the other North Atlantic Pact countries, as well as in Spain and South America. It may be adopted as one of the standard jet trainers of the NATO air forces.

Book Reviews

Le Transport aérien dans l'Union française (Résultats de 1951).—Issued by the Secretariat General of Civil and Commercial Aviation, Ministry of Public Works, Transport and Travel, Paris, 1952.

The French *Secretariat General of Civil Aviation* has published its third annual review of French air transport (for 1951), under the personal supervision of its head, *René Lemaire.* Produced in close collaboration with the Institut National de la Statistique, this report is a welcome change from the propaganda documents, to be found throughout the world, which sing the praises of a country's air transport system under the cloak of official publications. This French review inspires confidence. In purely objective fashion, it makes a critical analysis which never seeks to hide organizational weaknesses and does not hesitate to state clearly, for example (p. 10), that the increase in air traffic recorded in the French Union between 1950 and 1951 was considerably inferior to that experienced in other major air transport countries.

Naturally this does not mean that French air transportation has no successes to report. The contrary is rather what emerges from this report, which deals with the following aspects : general review of traffic figures ; analysis of passenger traffic ; volume of freight traffic ; air mail.

Would this objective type of reporting might be copied by air transport authorities in other countries. *He.*

Die Schweiz—Illustriertes Reisehandbuch. 20th revised edition ; edited by Walter Stalder.—336 pages. Price Fr. 16.65. Verbandsdruckerei AG ; Berne 1952.

This richly illustrated and carefully prepared travel guide describes 149 tours in all parts of Switzerland. Everything of interest about each place, from historical and artistic outlines, museums, churches, historic buildings, to railway stations, airports, steamer stations and tram routes for excursions into the surrounding countryside, are given in concise, easily readable form, with particularly clear plans, maps and photographs. The tourist consulting this guide will be able to make better use of his time. 192 black and white pictures, 40 five-colour maps with details of walking times, 16 diagrammatic panoramas, etc. *He.*

Farnborough Parade

The Avro 698 delta bomber, most significant expression of Britain's new aircraft design trend.

The 1952 Farnborough Display organized by the Society of British Aircraft Constructors from September 1st to 7th is a thing of the past, and already we are wondering what next year's show will bring. In the meantime, we have been able to sort out our ideas on this year's event, and we now feel that the most lasting impressions were left by Britain's "delta-mindedness," her lead in the construction of modern airline prototypes, and her advance in the design of fast fighters—in that order.

Thirty-five aircraft were demonstrated in flight (cf. last month's issue of *Interavia Review.)* In addition, there was a galaxy of well-known aircraft, demonstrated at earlier shows, which stayed on the ground. Of those shown in flight, seven were jet-propelled fighters, including two powerful twin-engined all-weather fighters, two high-speed short-range interceptors, one twin-engined night-fighter, one twin-engined naval fighter (Supermarine Type 508), and one single-engined carrier-borne fighter. In addition, there was a turboprop-powered naval attack aircraft. The performance of the first four was striking, but it was almost equally striking to note that production is still lagging. Only the last three types (Hawker "Sea Hawk," Armstrong-Whitworth N.F.11 and Westland "Wyvern")—not of the latest vintage—are in full production, two of them in actual squadron service. Of the first four fighters, three have been awarded "super priority" in production ("Hunter," "Swift," "Javelin"), but the effects of this arrangement will not become evident for some time.

Five aircraft were bombers, two of which were modern jet types on order for the RAF ("Valiant" and Avro 698) but available only in prototype form so far. The Short SA/4 prototype is not on order but may provide an excellent engine test bed in the future. The remaining two bombers were propeller-driven types and specialized in anti-submarine work, namely, the four-engined Avro "Shackleton," now in squadron service, and the Fairey "Gannet" turboprop-driven type, which has also been awarded "super-priority."

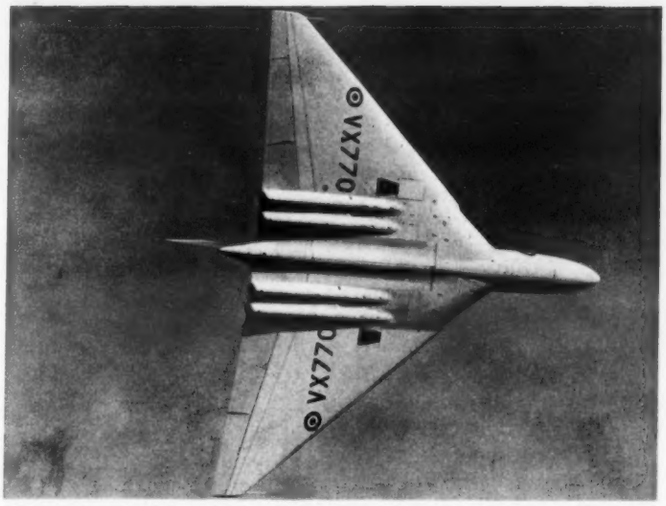
Seven commercial transports ranging from short-stage to long-distance airliners emphasized the progress Britain has made in this field since the war. The small de Havilland "Heron" appeared in Japanese markings (several have been sold to Japan); the Percival "Prince" is available as an executive transport; the slow-flying, single-engined Scottish Aviation "Pioneer" demonstrated its suitability for "outback" operations; the de Havilland "Comet," with "Sprite" rocket take-off assistance, showed its ability to take off from high-level, high-temperature fields with full load; the Vickers-Armstrongs "Viscount" and Bristol "Britannia" turboprop airliners, are both on order for the British airline corporations; and the huge Saro "Princess" turboprop flying-boat, which probably will never see operational service, brought back nostalgic memories of flying-boat travel.

There were five trainers, all of them shown on earlier occasions, with the exception of the English Electric "Canberra T.4" bomber trainer.

In the helicopter field, two of the four types were new. They came from opposite ends of the scale: the twin-engined 14-seater Bristol 173, and the tiny two-seater Saro "Skeeter."

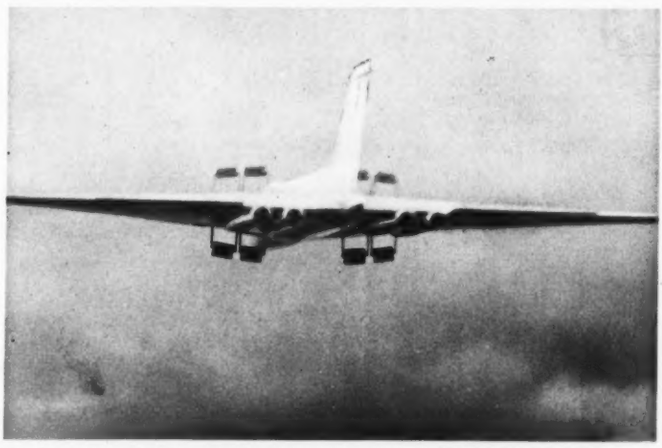
The remaining six machines were purely experimental. Four of them were flying engine test-beds, two (Avro 707A and 707B) were delta research aircraft.

Volumes have already been written on the show, and we therefore limit this report to a photographic parade of the newer aircraft and interesting scenes at Farnborough and to a brief appreciation of the career of John Derry, the well-liked de Havilland test pilot, who lost his life in the tragic accident which marred the last-but-one day of the Display.



Avro 698 in a steep bank. Prior to the show the aircraft had flown only a few hours, but Avro's Chief Test Pilot, R. J. Falk, the only crew member, handled it as if he had never flown anything else.

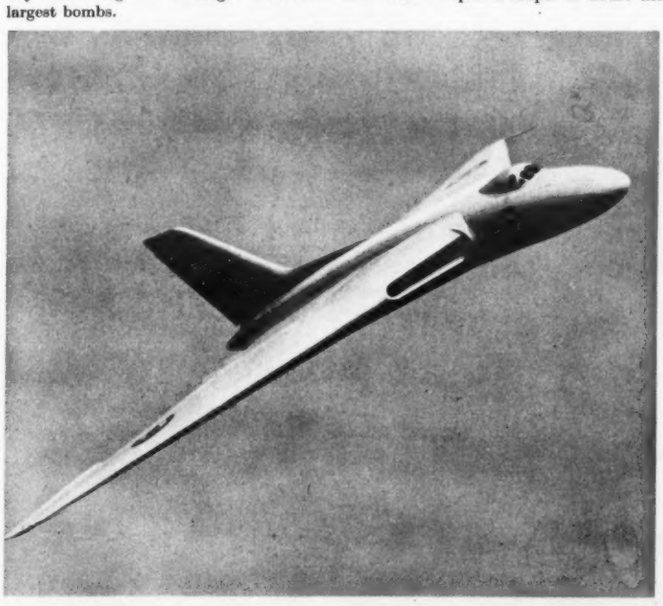
The rounded air intake lips of the Avro 698 suggest air speeds of Mach .85 at most—above that speed sharp tips with slots to improve the flow at take-off would seem likely. In the background, an Avro 707A experimental delta.



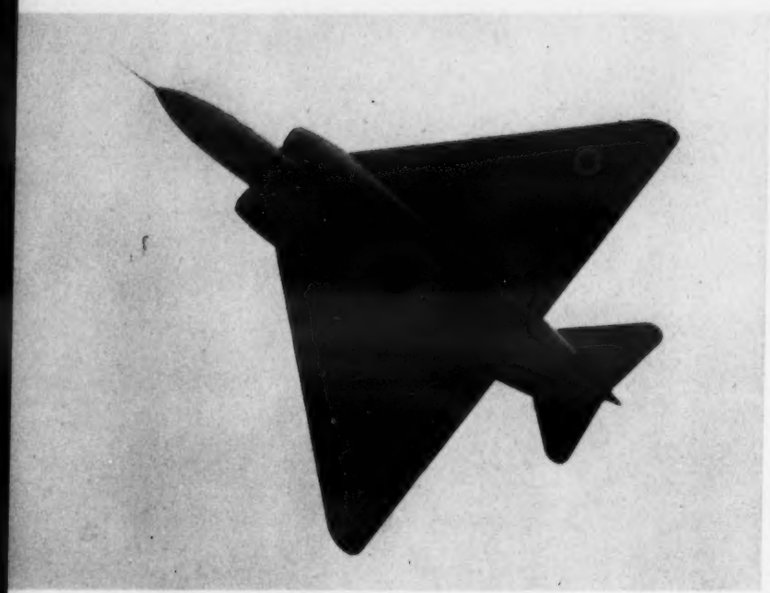
The Avro 698's air brakes are hinged just ahead of the main landing gear legs. They throw clear of the air flow above and below the wing. The plates seem adjustable after extension to give control. Snap extension seems certain to avoid lift losses.

The engines of the Avro 698—R.R. "Avons" at present, Bristol "Olympus" later on—are underslung and well aft.

The cylindrical pressure cabin is attached ahead of the Avro 698's wing. The bomb bay runs along the "fuselage" extension. The latter's depth is ample to house the largest bombs.



The tall undercarriage allows easy withdrawal of underslung engines for servicing. The undercarriage features relatively narrow track and short wheel base.



The Gloster G.A.5 "Javelin" twin-jet all-weather delta-wing fighter. This is the second prototype.

Bill Waterton, Gloster Chief Test Pilot, banks the "Javelin." Bulge on top of tailplane contains brake 'chute.

The "Javelin" gets ready for take-off. It has two Armstrong-Siddeley "Sapphires."

The "Javelin" takes off. It was under a speed restriction at Farnborough, did not crash the sonic barrier. Landing attitude is remarkably horizontal for a delta, thanks to the tailplane.

Little father of a big son : the Avro 707B experimental delta flown by Jim Orrell. The 707 series provided important data for the design of the big 698. A 100-passenger-plus version of the latter is now said to be under consideration.

Shape of things to come : the Fairey delta-wing guided missile, no doubt intended for aircraft design research. Several other British firms, apart from Avro and Faireys, are interested in deltas, including Shorts and Boulton Paul.

John Douglas Derry, D. F. C. †

With the death of Squadron Leader John Derry, British aviation has lost not only one of its most brilliant pilots, but also one of its pleasantest personalities. Despite his success as a test pilot and the glamour which naturally attached to being Britain's first and leading exponent of "Mach One Plus" flight, John Derry remained as cheery, unassuming and approachable as when he joined the band of de Havilland test pilots five years ago.

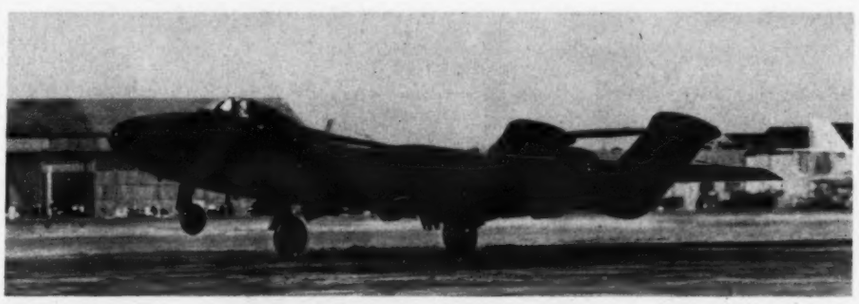
I remember visiting Hatfield one spring day when a delegation from an Eastern air force had come to see the "Chipmunk" trainer. Derry took off in the demonstration machine and proceeded to give one of the neatest aerobatic performances I have ever witnessed. There was not much ceiling and no horizon, but he performed every manoeuvre one expects from a trainer—and several one does not expect. When he had landed I met him by the "Chipmunk"; he said he was afraid that he was rather out of practice, as he had not flown the "Chipmunk" for more than six months. That was typical of Derry's completely natural and unaffected modesty.

John Derry's flying career epitomised his character. Born in Cairo in December 1921, he was educated at Charterhouse School—which he left in 1939 before he was eighteen in order to get to war with the least delay. At that time, there were more pilot trainees with the Civil Air Guard than the RAF could handle, so Derry joined up as a wireless operator/air gunner rather than wait. After a tour in Lockheed "Hudsons" of Coastal Command, he was commissioned as a Gunnery Leader in 1942. Then he managed to get posted for training as a pilot and went to Canada in 1943 to learn to fly.

After a spell as a ferry pilot, he joined No. 182 Squadron of 124 Wing, 2nd Tactical Air Force, in October 1944. Equipped with Hawker "Typhoons," this unit was engaged on close-support duties on the Second Front and gave John Derry the long awaited opportunity to employ the dash and brilliance of his flying to full advantage. His career was now meteoric, for in December of the same year he was posted as a Flight Commander in 181 Squadron, only to return to 182 as its Squadron Leader in March 1945.

In October 1945 No. 182 Squadron was disbanded and Derry was made C. O. of the Day Fighter Leader School at the Central Flying School. Demobilised in November 1946, he spent a year with Vickers Supermarine as an experimental and production test pilot.

It was in October 1947 that John Derry joined de Havillands, a little over a year after Geoffrey de Havilland Jr. had lost his life in the second D.H. 108 experimental aircraft. Derry took over the test flying on the two remaining machines, one for slow speed, the other for sonic research, on which so much of the design of the "Comet" and the D.H. 110 was based. On April 12th, 1948, Derry broke the 100-km closed circuit speed record at 605.23 m.p.h. and on September 6th of the same year passed Mach 1 in a shallow dive.



John Derry's last job started when he took the D.H. 110 up for its first flight on 26th September, 1951. On 9th April, 1952, he made the first supersonic flight in this aeroplane and since then he had many times passed through the barrier in both prototypes, the last occasion being a few moments before his death.

Exactly why the D.H. 110 all-weather fighter prototype disintegrated on the second public day of the 1952 SBAC Display, killing John Derry and his observer, Anthony Richards, as well as killing and injuring a large number of spectators, may never be discovered. It seems likely, however, that collapse of the nose radome, possibly due to weakening of the plastic structure by abrasion after diving through rain and cloud, or even the loss of a small cowling panel initiated the disintegration.

John Derry was not only a fearless pilot, but also a skilled, thoughtful man of research to whom much of the future will be due. *J.H.S.*

Unauthorized visitors: several North American F-86 "Sabre" fighters streaked across Farnborough airfield on more than one day, although the field had been declared out of bounds for other aircraft. They belonged to a nearby American or Canadian base, and the pilots seem to have been just curious . . .

Curious, too, was Prince Philip, Duke of Edinburgh. Here he inspects the contra-rotating props of a Westland "Wyvern" naval strike aircraft.

The Germans had been invited in force. Among them was Professor Ernst Heinkel, former German aircraft manufacturer (seated, with Leica camera); on his right are Dr. Bentele, his Chief Engineer, and Herr Walter, his factory manager. Standing is his fourteen-year-old son, Karl Ernst. The British reportedly are interested in Germany's industrial potential for subcontract work, as well as in the future German civil aircraft market.

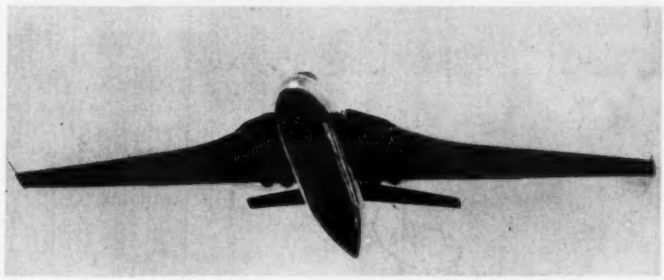
Modern transports were the second impressive feature of the 1952 show. The big Bristol 175 "Britannia," flown by veteran test pilot Bill Pegg, surprised spectators by the low, pleasing sound of its four "Proteus 2" turbo-props. "Proteus 3's" will be fitted to production models.

A rear view of the "Britannia." Turbine exhausts are on top of nacelles.

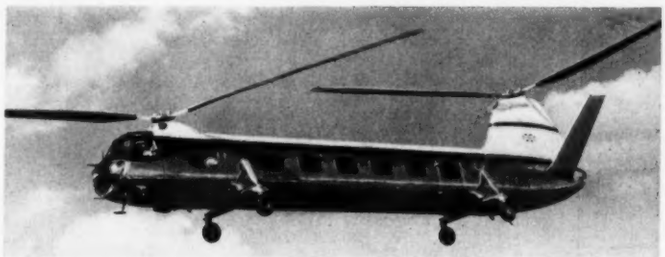
The "Britannia" touches down. Nose gear has twin wheels, main legs have a four-wheel bogey. BOAC has ordered 26 "Britannias," mostly for long-range tourist services.

British European Airways, too, is getting a turbo-prop airliner. This is the first production Vickers 701 "Viscount," christened "Discovery" as the first of its class of that name. Piloted by E. B. Trubshaw, the machine flies steadily (practically empty, of course) with the "maximum permissible number" of engines stopped—namely, three.

The huge Saunders-Roe "Princess" flying-boat, firmly controlled by flying-boat specialist Geoffrey Tyson, sailed majestically by on one of the Display days but stayed at home afterwards because of trouble with one of her ten turbo-prop engines. Pity the other two machines on order won't be finished for the time being. Flying-boat travel is very comfortable.

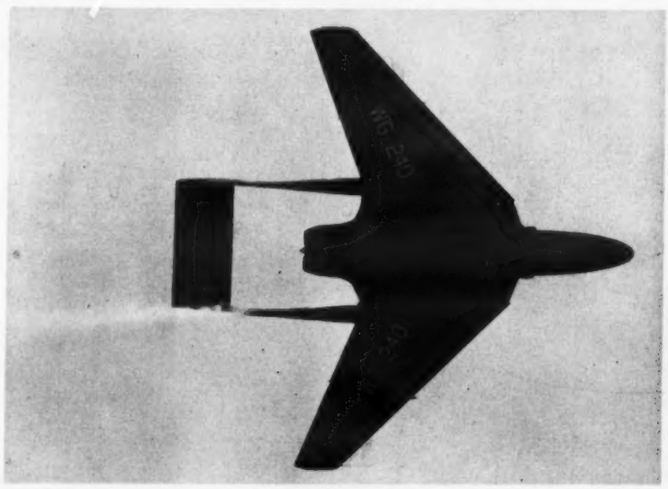


The second prototype of the Vickers "Valiant" four-jet bomber, also flown by Trubshaw. The air intakes have been modified considerably.

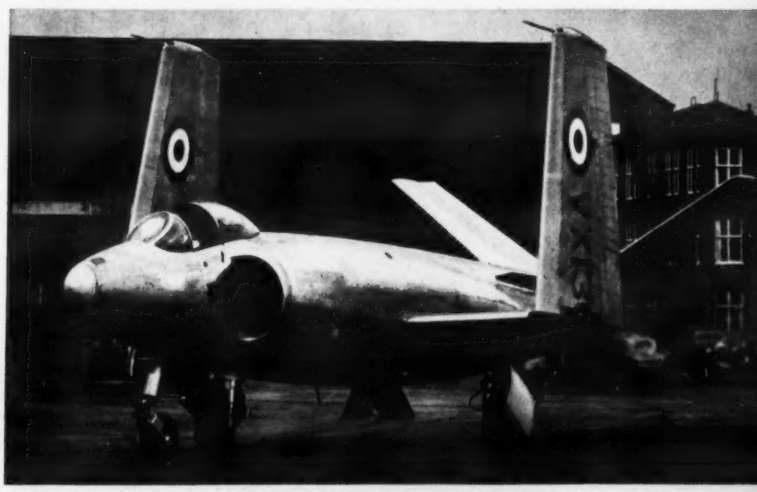


The Bristol 173 fourteen-passenger helicopter was demonstrated by C. T. D. Hosegood. It is the forerunner of a larger inter-city helicopter to be operated by British European Airways.

The small Saunders-Roe "Skeeter" two-seat helicopter was put through its paces by John Jeffery. A manoeuvrable little machine, the "Skeeter" is said to be "very cheap" to produce.



Fast fighter: the second prototype de Havilland D.H. 110 twin-engined all-weather fighter. It was in the first prototype that John Derry and Tony Richards lost their lives on September 6th.



Another fast twin-engined fighter: the Vickers-Supermarine 508 naval type, which was demonstrated by Supermarine's crack test pilot, Mike Lithgow. Its speed range is remarkable. The slow runs, with the help of leading edge "droop-snoot" flaps, were particularly impressive.

The Vickers-Supermarine "Swift" single-seater interceptor, flown by David Morgan. This is one of the two near-sonic interceptors in "super-priority" production for the RAF.

Squadron Leader Neville Duke repeatedly dived his Hawker P. 1067 "Hunter" interceptor through the sonic barrier. The resulting thunderclaps sounded like Ack-Ack fire. The "Hunter," too, is in "super-priority" production.

Destination North Pole

On May 3rd, 1952, a twin-engined Douglas C-47 transport, equipped with skis, landed at the geographic North Pole. The ten occupants of the aircraft stayed there for three hours and ten minutes, took scientific measurements and data, and calmly departed. Just that easy!

One wonders what all those North Pole explorers who tried to and did reach the Pole in months-long overland (or over-ice) treks would say to this feat—Franklin, Nansen, Peary, Cook, MacMillan and the others. Even those who attempted to attain or succeeded in passing over the North Pole by air, beginning with Andrée's luckless balloon attempt from Spitzbergen in 1897, continuing with the airship and aeroplane flights of Nobile, Amundsen, Byrd and Ellsworth in the 'twenties, would never have dreamed of landing their craft at the Pole.

The apparent ease with which the USAF's C-47 accomplished its flight was backed up by weeks of intensive preparation, which in turn was based on experience gathered during several years of polar flying.

T-3, the floating ice island, which the USAF has used to establish a weather station. A Grumman SA-16 amphibian is about to make a routine landing. A Douglas C-47 is in the foreground, another in the distance; aircraft as large as the C-54 "Skymaster" have landed there. "Population" has fluctuated from a low of 3 to a high of 30.

Landing at the North Pole. Members of the USAF party that landed there on May 3rd, 1952, place the American flag on top of the world. At the base of the oil drum monument are placed glass jars containing dated notes which, the Air Force hopes, will contribute to their knowledge of Arctic Ocean currents when they are found—very likely elsewhere—at some later date.

Robert Cotell, a scientist from the USAF Cambridge Research Centre, Cambridge, Mass., records the earth's strongest gravitational pull during the 3 hrs. 10 mins. stop at the North Pole. Readings were taken from the gravity meter a few minutes after the landing. The delicate instrument was kept warm by plugging it into the aircraft's electrical system.

Pilot and Co-pilot of the North Pole C-47. Left, Lt.-Colonel William P. Benedict, of Paradise, Calif.; right, Lt.-Colonel Joseph O. Fletcher, of Shawnee, Okla. Fletcher is organizer and commander of Alaskan Air Command's special Weather Station and Scientific Expedition on T-3, the floating ice island.

It was a month-and-a-half before the landing at the Pole, on March 19th, that the ski-equipped C-47, piloted by Lt.-Colonel Joseph O. Fletcher, first landed on a floating ice island. The island, named T-3, or "Fletcher's Island" after the pilot of the aircraft, had actually been discovered in the middle of 1950 by crews on "Operation Ptarmigan," the USAF's daily Polar region weather flights from Alaska. Another floating island, named T-2, was sighted at the same time, whereas T-1 had been reported in 1946. T-3 floats around the North Pole along a course resembling an eccentric ellipse.

It was decided that the latest find, T-3, was to be used for an experimental test to determine if it would be possible to establish a weather station for the USAF Air Weather Service on this 7,000,000,000-ton chunk of ice. As a result, men and equipment were brought in by C-47's, four-engined Douglas C-54 "Skymasters" and twin-engined Grumman SA-16 "Albatross" amphibians.

Without the wealth of polar navigation experience built up since 1946 by Air Weather Service navigators, even this expedition near the top of the world would not have been possible. Owing to the proximity to the Magnetic Pole, navigation in the polar regions is unlike that in any other area of the world, and aircraft flying to and from T-3 depend upon experienced navigators to guide them safely over the treacherous Arctic ice pack.

After sighting Peary's signpost and landing on Ellesmere Island, Col. Fletcher climbs along the rock ridges. He collected rock samples to compare them with the dirt taken from the ice on T-3 in an endeavour to discover the ice island's origin.

The now broken signpost built by a member of Admiral Peary's party on Ellesmere Island in 1909 and re-discovered by a USAF C-47 on May 4th, 1952. Left, Colonel Fletcher ; right, Colonel Benedict.

Once the base at T-3 was established, several flights were made over the geographic North Pole by USAF aircraft using the base as a staging stop. Finally, on May 3rd, a C-47 made history by setting down near the Pole. It returned to T-3 later in the day.

On May 4th the expedition flew over the pack ice to inspect the ice shelf off the coast of Ellesmere Island, last point of known land beyond the Arctic circle. Suddenly the pilot sighted a battered signpost standing atop the Island's snow-covered Cape Columbia, more than a thousand miles north of the Arctic Circle. This was reason enough for Pilot Benedict and Co-pilot Fletcher to make an unscheduled ski landing about one mile from where the post had been spotted, and the party then walked over the icy waste and ridges.

They found that the post marked the land point where Admiral Robert Peary's expedition started its 53-day, 826-mile round trip to the North Pole in 1909. The top portion of the post had been broken and was dangling by the heavy wire used to guy the post which was set into a pile of stones. A few yards away was a cache of four wood-crated metal boxes under a tripod of broken sled runners, lashed together with wire and wind-frayed manila rope.

Although the Polar flyers were familiar with Peary's book, "The North Pole: Its Discovery," in which he described the sign, and although they knew that Cape Columbia had been his point of departure and return, the discovery came as a complete surprise to them.

The information on the signpost, which was erected by George Borup, a member of Peary's party, and two Eskimos does not coincide with the description in Admiral Peary's book. The eastern arm pointing to Cape Morris K. Jessup was marked 255 miles : Peary's account gave the distance as 275 miles. The southern arm, inscribed "Cape Columbia, June 8, 1906," disagrees with the book which gives the date as June 6th. The western arm pointing to Cape Thomas Hubbard bore the date "June 27, 1906," which Peary recorded as July 1st, 1906.

This led the USAF to believe that Admiral Peary may have written that portion of his book from memory by tracing the dates back by the number of "marches" from a known date. During the spring and summer in these latitudes, when the sun remains in the sky twenty-four hours a day, mistakes are easily made.

The USAF party disturbed nothing at Cape Columbia, but they did carve the date of their own visit with the mention, "One day after landing at the North Pole," together with their aircraft's serial number, into a ski which they left sticking into the snow next to Peary's monument.

"I couldn't have been more surprised if I had seen a man waving a flag down there," said Lt.-Colonel William P. Benedict, of Paradise, California, pilot of the aircraft. Then the big, red-haired veteran of 260 combat fighter missions with the Royal Canadian Air Force and the USAF in World War II and 39 months of Alaskan bush flying mused : "Where in the world would a man get enough courage to start across that pack ice for the North Pole—*on foot ?*"

Colonel Benedict holds part of Peary's broken marker which reads : PEARY, S. S. ROOSEVELT.

Three broken sled runners, tied with a piece of wind-frayed manila rope to form a tripod, mark the cache of wood-crated metal boxes left on Cape Columbia, a land point jutting into the Arctic Ocean from Canada's Ellesmere Island, by Admiral Peary in 1909. A few yards away is the signpost described by Peary in his book to designate his point of departure from land to the North Pole, 413 miles away. Peary's party returned to this spot after a 53-day round trip over the pack ice.

IATA at Work and Play

IATA's Eighth Annual General Meeting opens at the Palais du Conseil Général in Geneva. Reading the inaugural address is Federal Councillor Joseph Escher, Swiss Minister of Transport. At extreme left on the rostrum, Sir Miles Thomas, past President of IATA, next to him, Councillor Louis Casaï, head of the Government of the Canton of Geneva. At extreme right, Sir William Hildred, Director-General of IATA, on his right, Dr. Walter Berchtold, Managing Director of Swissair, 1952-1953 President of IATA.

The Director-General and his Presidents : Sir William Hildred in conversation with Gordon R. McGregor, President of Trans-Canada Air Lines, IATA President-elect for 1953-1954 ; centre, Dr. Walter Berchtold, Swissair Managing Director, 1952-1953 IATA President.

"Are you by any chance talking about the Irish?," says the belligerent Irishman to the two Englishmen. "No, not at all," they replied. "Do you mean to say that Ireland isn't worth talking about ?" retorted the Irishman.—*Left,* Captain J. C. Kelly-Rogers, Assistant General Manager (Technical), Aer Lingus Teoranta, Irish Air Lines ; *right,* J. F. Dempsey, General Manager of the line. In the centre, a well-known Englishman, John William Sefton Brancker, General Manager (International Affairs), British Oversea Airways Corp.—Sir William Hildred had just related that in Ireland they say : "If you can see them hills, it's going to rain ; if you can't see them hills, it's raining . . ."

"Hand it over," KLM President Dr. A. Plesman seems to say to Dennis Handover, Special Adviser to IATA. Left is Dr. Alphonse Ehinger, Swissair Board Member ; next to him, Joseph Desmet, Sabena Deputy Director for External Relations ; second from right, W. Hudson Fysh, Qantas Empire Airways Chairman and Managing Director.

Pan American World Airways' powerful delegation in the assembly hall. *Left to right :* Willis G. Lipscomb, Vice-President (Traffic & Sales), the Atlantic tourist fare pioneer at last year's AGM and the subsequent traffic conference ; Vice-President E. Balluder and Vice-President John C. Leslie.

Charles Dickens might have written the first few words of "Tale of Two Cities"—slightly modified—expressly for the *Eighth Annual General Meeting* of the *International Air Transport Association,* which was held in Geneva, Switzerland, from September 15th to 19th. "It was the best of times, it was the worst of times, it was the time of wisdom, it was the time of foolishness . . ."

Sir William P. Hildred, Director-General of IATA, said enthusiastically at the end of the five-day gathering : "This has been the most terrific AGM we've ever had . . ." Coming from a man who certainly can be regarded as the world airline industry's most competent arbiter of conferences and meetings, this pronouncement is indeed a compliment to the welcome given to about 200 delegates of the international airlines, international organizations and about 90 "airline wives" by the host airline, Swissair, and by the Swiss authorities.

The time of wisdom was strictly reserved for the hours of daylight ; the "best of times" was enjoyed mostly after dark but sometimes also during the luncheon recess, the time of foolishness was left to individual discretion in this hospitable city on the shores of *Lac Léman,* and "the worst of times" was no doubt experienced by many around breakfast in the morning.

*

The meeting was officially opened by Federal Councillor Joseph Escher, Swiss Minister of Transport, who in his inaugural speech suggested the formation of a single, closely integrated European air transport system. The theme was taken up by *Dr. Walter Berchtold,* Managing Director of Swissair, who took over the Presidency of IATA for 1952-1953 from Sir Miles Thomas, Chairman of BOAC, and who expressed the view that "the problems of air transport within Europe will find a better solution through free co-operation among air carriers than through the creation of a new, unified body . . ."

On the last day of the Meeting, IATA accepted the invitation of Trans-Canada Air Lines, Canadian Pacific Airlines and the Canadian Government to hold the 9th AGM in Montreal or Quebec in September of next year, and TCA's President, *Gordon R. McGregor,* was elected President of IATA for 1953-1954. At the same time, Max Hymans, Chairman of Air France, invited IATA to convene its 10th

Beauties and the beasts. IATA beauties are (centre) Miss Florence McAnnally, of IATA-Montreal, and (right) Miss Reine Goulet, a French-Canadian now at IATA's Paris office. Beasts are (second from left) F. J. H. Johnston, IATA Assistant Treasurer, and (second from right) R. C. ("Rod") McInnes, Director of Public Relations, Trans Canada Air Lines. Scene : City of Geneva's cocktail party at the Parc des Eaux-Vives, Geneva.

Hmmm . . . Mrs. Cooper (centre) looks on as B. G. Cooper, of Cyprus Airways, admires the bright green spectacle frames of Miss Upton, Secretary to V. de Boursac, Secretary of IATA's Paris Branch Office. Parc des Eaux-Vives.

Annual General Meeting in Paris. Since there is some question as to whether future General Meetings will be held yearly or every two years, it is still undecided whether IATA will go to Paris in 1954 or 1955.

In his report to the Meeting, *Sir William P. Hildred,* Director-General of IATA, estimated that the international airlines will end the year 1952 by having flown a total of 45,000,000 passengers. They will have travelled an average of 1,000 kilometers each, while the 2,500 aircraft of IATA's member companies will have flown a total of 1,700,000,000 kilometers. Cargo operations for 1952 will pass the 1,000,000 tonne-km mark for the first time, while approximately 275,000,000 tonne-km of mail will be carried. In the course of these operations the scheduled international airlines will perform almost 5,000,000,000 revenue tonne-km—nearly two-and-a-half times the 1947 figure. "As a strict guess," Hildred said that IATA airline revenues for 1952 will total something less than $2,000,000,000. They had ended 1951 with a gross profit of about

And here is M. de Boursac himself at the ESSO–Shell–BP dance at the Hôtel Richemond, "rug-cutting" with Miss Hopper, Secretary to Lord Douglas of Kirtleside, Chairman of British European Airways.

An informal formal picture taken at the Richemond. *Left to right :* Sir William P. Hildred ; Lady Hildred ; Dr. Walter Berchtold ; Mrs. Berchtold ; Lady Thomas ; Sir Miles Thomas.

"What the experienced air traveller wears . . ." Anyway, they had an excellent fashion show at the Hôtel Richemond, staged by Fischer, Haute Couture. The models, both wearers and worn, were duly admired (notice the expression on the face of the gentleman at extreme right).

Caught . . . J. B. Miller, District Sales Manager (Washington) for United Airlines, dances with local Geneva talent. In the background, looking like someone out of "Pickwick Papers," is F. Filliol, Swissair Press Officer for Western Switzerland, dancing with Mrs. Filliol.

Tsk . . . tsk . . . A. D. ("Don") Bennett, of BOAC, now an adviser to Iraqi Airways, charms Mrs. Leakey, of IATA, at the Richemond party.

The hosts at the Douglas Aircraft luncheon, Hotel Beau-Rivage. *Right to left:* Mike E. Oliveau, Director of Douglas Aircraft's European Division, now with headquarters in Geneva ; E. H. Baker, Assistant Director of Sales ; Mrs. Baker ; Mrs. Oliveau.

Dinner with the ghosts of Byron and François de Bonivard at the Château de Chillon, near Montreux. Enjoying their candlelight dinner are (facing camera, right to left) Lady Douglas of Kirtleside ; Mrs. R. Heberlein, wife of Dr. Heberlein, Swissair Chairman ; and Sir Miles Thomas, BOAC Chairman ; in foreground, Tony Hildred, son of the IATA Director-General, who is now gathering practical experience of the air transport business with Swissair in Geneva.

$150,000,000 from operating revenues of $1,700,000,000, but most of this profit was immediately consumed by taxes, development expenses, financing of new equipment and servicing of debts.

After reviewing the reports by its six standing Committees (Executive, Traffic, Technical, Legal, Financial, Medical), the Meeting settled down to its major topic of discussion, namely, the world-wide pattern of agreed international rates and fares. The Meeting warned against the serious effect of attempted unilateral regional protectionism by governments on the world rate structure.

During these discussions the desirability of a fundamental change in the statutes of IATA was brought to light. As is known, all decisions taken by the Association require a unanimous vote of approval by member airline companies, and a single carrier's disapproval is sufficient for the rejection of any recommendation, even if the company is not directly interested in the question. Thus, for instance, a recent request by British European Airways and Air France for authorization to sell wine and beer on their London—Paris tourist service was rejected simply because a small Middle Eastern company objected. As a result, Max Hymans, Chairman of Air France, put forward a special motion in which he stated that, while adhering to the principle of "necessary unanimity," the top executives of companies directly interested in a particular problem should be able to convene whenever necessary to find a solution ; *alternatively, a body of arbitration composed of three members should be appointed within IATA to which all decisions "blocked" by an unjustified veto could be submitted.* As a result of this motion, the General Meeting authorized the Executive Committee to "consider the possibility of some form of arbitration" in cases of failure to reach unanimous agreement on matters of secondary importance at IATA Traffic Conferences.

*

Outside the conference hall, IATA thoroughly enjoyed itself. Cocktail parties organized by the City of Geneva, by the Association of French Aircraft Manufacturers and by Lockheed Aircraft, lunches given by the City of Lausanne and by Douglas Aircraft ; a gala dinner by Swissair, the host airline ; a candlelight dinner in the charming setting of the Knights' Hall of Chillon Castle, offered by the Canton of Vaud ; a dance organized by the ESSO, Shell and BP petroleum companies ; an after-dinner party by KLM's President, Dr. Plesman, kept delegates, wives and secretaries busy. Apart from these organized parties, well-stocked cellars invited Geneva's foreign guests to do their worst—against payment, however.

Smiling faces belong to Dr. Walter Berchtold, Swissair Managing Director ; Mrs. Douglas Campbell ; and Mr. Douglas Campbell, Vice-President and General Manager of Pan American-Grace Airways.

And this is where these photos came from, in the IATA conference hall : buying them are (left) Willis G. Lipscomb, PAA Vice-President ; Mrs. Douglas Campbell and (to her left) Mrs. P. C. F. Lawton. Selling them are Madame Morand and Madame Vuarchex.

What's in the Air ? *

POLITICAL

European air equipment for NATO forces

● It is reported from London that the American Government has a comprehensive plan for *equipping European NATO units with front-line aircraft of European manufacture* (British, Italian and French types). William L. Batt, retiring economic adviser to the U.S. Embassy, London, stated that three types have been selected, the British Vickers-Supermarine " Swift ", the Italian-produced British de Havilland " Venom " and the French Dassault MD 452 " Mystère ". Batt added that the object of the programme was : (1) to relieve the American armament industry ; (2) to speed up European production of jet fighters, so as to improve the West's industrial potential ready for an emergency ; (3) to make European powers more " self-sufficient ".—There is however no intention at present of purchasing European equipment for use by United States forces.

Revision of Rome Convention

● On September 9th, 1952, an air law conference of the ICAO powers met in Rome to discuss a draft revision of the Rome Convention of May 29th, 1933. The subject matter of this convention, namely the question of liability for damage to third parties on the surface, was dealt with in an article by Maurice Lemoine in the September issue of Interavia (" Rome Air Law Conference ", p. 511). All that need be mentioned here is a passage from the opening speech by *ICAO President Dr. Edward P. Warner*, as his words apply so aptly to many international conferences and agreements. Warner expressed the hope that the new agreement would not only be signed—as in 1933—but that delegates would do everything in their power to get their national parliaments to ratify it. *Without ratification*, even the ideal text would remain a dead letter and the *costly conference would be a failure.*

Scandinavian-South African agreement

● Conclusion of a bilateral air agreement between the Union of South Africa and the three Scandinavian countries is expected for the end of October. The agreement will enable *SAS to extend its Stockholm-Nairobi service to Johannesburg*. However the South African aviation authorities are still raising objections against the planned commercial landings at Nairobi, Rome and Frankfurt, towns in which South African Airways itself has landing rights. (KLM Royal Dutch Airlines also encountered similar difficulties.)

It is interesting to note here that the South African carrier is being accused by many of its compatriots of showing monopolistic tendencies. For example, the question is being raised of whether administration of South African airports should not be removed from South African Airways, as the latter's management has led to friction with foreign airlines.

Prime Minister Winston Churchill professed himself very pleased with BEA's new Elizabethan Class cabin, when he and Mrs. Churchill flew to Nice for an autumn holiday at Lord Beaverbrook's villa. Left : Peter Masefield, BEA's Chief Executive.

For example, South African Airways has refused to provide office space for foreign airlines in the terminal building at Palmietfontein's new Jan Smuts International Airport (to be ready for operation by the beginning of 1953) . . . giving the strange excuse that Government funds for the construction of the airport had been reduced so that there was no space left for foreign companies. Not surprisingly Europeans and Americans have gained the impression that they are being made the victims of the " apartheid " policy (racial segregation).

SERVICE AVIATION

NATO armaments position

● In mid-September a number of leading personalities from the U.S. Defense Department and the U.S. Air Force declared that the relatively high target set for *air armaments* by the NATO Council at its *Lisbon meeting* in February 1952 (4000 first-line aircraft for Europe by the end of 1952) could *probably be reached to within 5 to 6%*, in spite of the strike in the American steel industry and other production difficulties. The same applied to the 50 NATO divisions to be set up by the end of 1952. However, a clear picture of the NATO armament situation cannot be obtained until NATO's military committee and the Council of Ministers hold their conference on December 15th (in Paris) and agree on the 1953-54 programme.

Camp Guynemer

● *Headquarters, Allied Air Forces, Central Europe*, Fontainebleau, has been christened *Camp Guynemer*, in honour of the well-known French World War I pilot, Captain Georges Guynemer, who was killed on the Belgian front in 1917. He was credited with shooting down 53 German aircraft and with another 8 " probables ".

Korea

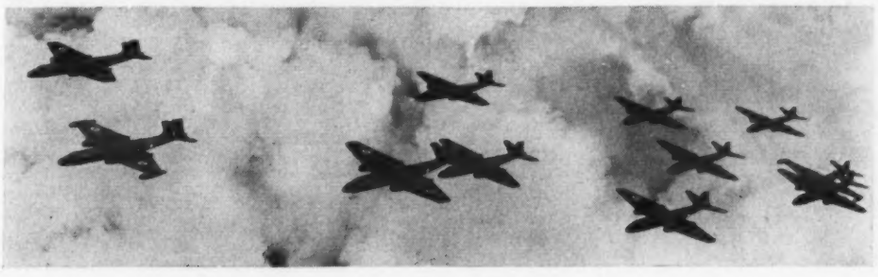
● *U.S. Air Force Secretary Thomas K. Finletter* has stated that the Communist forces in Korea now have *over 2100 aircraft, including 1300 jet aircraft*. American intelligence had reported that a large number of twin-jet bombers had arrived behind the front (but were not yet in action). Finletter warned that mass operations by these aircraft might alter the whole aspect of the Korean air war, but added that Allied air forces had been reinforced by about 50 % during recent months.

Count Louis de Beauregard, Inspector General and member of the Board of Air France, was killed in a car accident on September 13th, on his way to the IATA General Meeting in Geneva. His wife who was with him was seriously injured.

United States defence budget

● *U.S. Defense Secretary Robert A. Lovett* has forecast that *defence appropriations for the 1954*

English Electric " Canberra " twin-jet bomber on one of its first squadron flights over the English coast.



* Extracts from " Interavia Air Letter ", daily international news digest, in English, French and German. All rights reserved.

fiscal year (beginning on July 1st, 1953) *will probably be lower* than during the current year, since many military items are being shifted from the "build-up" to the "sustaining" phase. The main load of rearmament had fallen upon the 1953 fiscal year. Expenditure for new war material and military constructions had risen relatively more rapidly since the outbreak of the Korean conflict than during the period of greatest expansion in World War II. A comparison between production figures for the July-September quarter for 1950 and the April-June quarter in 1952 shows the following increases: aircraft production increased 3.9 times; warship production 2.5 times; tanks 12.3 times; ammunition 14.4 times; electronics equipment 7.8 times; machine tools 45.9 times.

AIR TRANSPORTATION

IATA General Meeting

● The results of the International Air Transport Association's Eighth Annual General Meeting held in Geneva between September 15th and 19th are described elsewhere in this issue. Here reference will merely be made to the following points: (1) on the invitation of the newly-elected *IATA President for 1953-54, Gordon McGregor* (Trans Canada Air Lines) the Ninth Annual General Meeting will be held in Montreal in September 1953; (2) Max Hymans, President of Air France, put forward the claims of Paris for the 1954 Meeting; (3) the general impression left by this year's Meeting was that *world air transport is making gratifying progress towards unification*—on the technical and economic levels—though the *fight against red tape* in certain countries is *still far from having been won.*

USA: the aircraft and agriculture

● During 1951 aircraft rendered agriculture and forestry in the United States the following services:

dusted 17,649,802 acres
sprayed 12,919,629 acres
fertilized 2,127,457 acres
seeded 2,069,013 acres and
sprayed 1,561,013 acres in towns and cities.

These figures show to what extent the use of aircraft in agriculture has become an important economic factor in the USA, an impression that is further strengthened by the quantity of chemicals used, viz:—

137,903 tons of dust
109,046 tons of fertilizer.

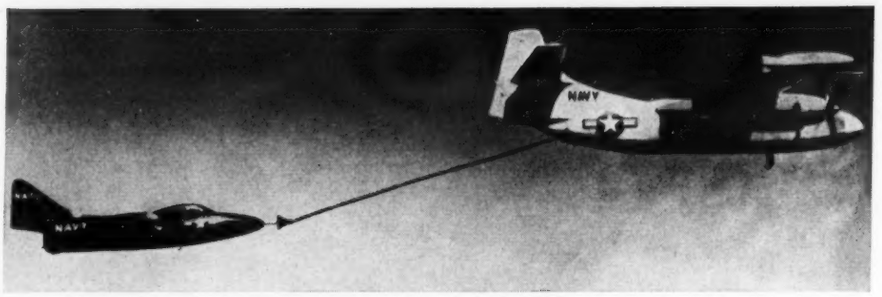
Efforts at concentrating Australia-New Zealand air transport

● Australian air transport circles are discussing merger negotiations between the following companies operating air services in Australia and New Zealand: Qantas Empire Airways/Tasman Empire Airways/Trans-Australia Airlines, with BOAC taking over a substantial part of the capital. Later participation by British Commonwealth Pacific Airlines is also under consideration.

AIRCRAFT INDUSTRY

U.S. aircraft industry in the lead

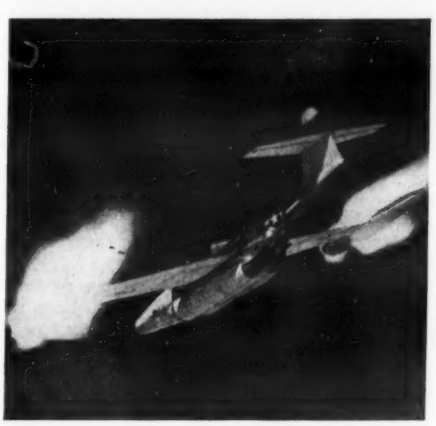
● Backlog of orders for *aircraft, engines and propellers* held by American firms on June 30th, 1952 amounted to $14,507,000,000, the *highest level ever recorded in peacetime.* Employment figures *rose* by 5% over those for March 31st, 1952, and by *over 53%* over June 30th, 1951 (!). The aircraft industry has thus become the busiest industry in the United States.



North American AJ-1 "Savage" naval bombers are being converted into flying tankers.

... accompanied by wage disputes

● This gratifying growth in the American aircraft industry is however accompanied by stubborn wage disputes, which have been giving particular trouble on the West Coast. On September 8th, 25,000 workers at Lockheed Aircraft Corp.'s Burbank plant laid down tools—the first strike in the firm's history—and on September 15th they were followed by 13,000 workers at Douglas. A strike at North American Aviation Inc. was averted



Northrop F-89D "Scorpion" all-weather fighter firing its rockets (carried at the wing tips in front of the fuel tanks).

by a last-minute 10-cent wage increase, and Boeing Airplane Co. also has had to agree to a maximum rate of $2.40 an hour. Leading trade unionists—particularly from the powerful American Federation of Labour—recommend the formation of an "Airframe Panel", claiming that such an organization would balance the Aircraft Industries Association (the employers' association) and by its very existence help calm down the situation.

After the FIAT G. 49 two-seater trainer's first flight: (front row, left to right): FIAT's Chief Pilot Catella (light suit); Cerza and (half-left behind him) Melotti, of the FIAT management; General Remondino, of the Italian Air Staff (sunglasses), Professor Giuseppe Gabrielli, designer of the G. 49 and Technical Director of FIAT (dark tie with light stripes).

NEW AIRCRAFT—TWO PROJECTS

● *Convair 340* "*Convertible*" is the designation of a special version of the "Convair-Liner 340" twin-engined airliner. The "Convertible's" cabin is equipped for 44 to 56 passengers.

● *The American Helicopter Co.* recently brought out a new one-man helicopter, the *XH-26* "*Jet-Jeep*". As indicated by the name, this is a model with jet-powered rotor (a pulse-jet unit at each blade tip). The "Jet-Jeep" is said to have very promising flying qualities and to be going shortly to the U.S. Army for tests.

● *Handley Page* is working on a project for a long-range jet commercial transport. According to statements from the firm, the aircraft, designated the *H.P.97*, can carry up to 150 passengers in its double-decker fuselage, in long-range operations. Nothing is known of the engine planned.

● Two new prototypes of a twin-engined short and medium-stage airliner, the *Fokker F. 27* "*Friendship*", are under construction at Fokkers. Fitted out for 28 passengers, the F.27 is to have Rolls-Royce "Dart 3" propeller turbines. (1400 s.h.p. + 365 lbs residual thrust). If required, Wright "Cyclone 9" piston engines (1475 h.p.) can be fitted. A cargo version, the F.27 "Freightship", is also planned. — Span 95 ft. (29 m), wing area 754 sq. ft. (70 m²), max. take-off weight 31,950 lbs (15,000 kg), cruising speed 246 m.p.h. (396 km/h) at 20,000 ft, over block distances of 310 miles (500 km).

News in brief

● The *Hughes XH-17* giant helicopter began flight tests on September 16th. — Two new remote-controlled bombers, the *Northrop XB-62* "*Snark*" and the *Bell XB-63* "*Rascal*", are under development for the U.S. Air Force. A first unmanned bomber—the Martin B-61 "Matador"—went into quantity production for the Air Force some time ago; the remote-controlled unmanned Hughes XF-98 "Falcon" and Boeing XF-99 "Bowmark" fighters have already been reported upon.—The French engine firm of *SNECMA* is submitting the *SNECMA-ATAR* turbojet to exhaustive tests: experimentally Dassault MD 450 "Ouragan" fighters are being used as flying test beds—later the MD 452 "Mystère" is to be used. Two ATAR engines were recently sent to Britain for installation in a Gloster "Meteor" single-seater fighter.—A four-engined commercial transport of the SE 2010 "Armagnac" type is being used as a flying test bed for the *SNECMA* "*Vulcain*" high-performance turbojet.

MOSTRA DELL' AERONAUTICA

The Air Show at Milan's Forlanini Airport

(September 14th to 30th, 1952)

One corner of FIAT's stand : in the foreground the " Fiat-Ghost 48 Mk. 1" turbojet (de Havilland licence) ; right the 3060 h.p. AS. 6 engine from the MC. 72 racing aircraft of 1934.

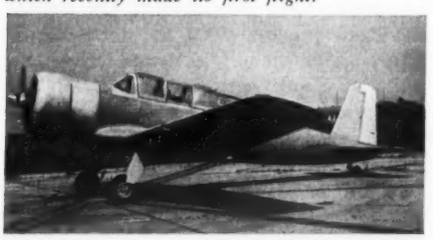
The *" Mostra dell'Aeronautica 1952 "*, Italy's first major air show since the war, was ceremoniously opened on Sunday, September 14th, by Vice-Premier Piccioni. Defence Minister Randolfo Pacciardi, who could not visit the Show until several days later, was represented by Under-Secretary of State Baresi and by Generals A. Urbani (Chief of the Air Staff) and F. Silvestri (Secretary-General to the Ministry of Defence-Air). Engineer Angelo Ambrosini, as Chairman of the Milan Aero Club and of the Show's organizing committee, read the address of welcome.

The " Mostra " presented a comprehensive picture of Italian aviation today and of its historical development. Exhibits included not only *original aircraft from pioneer days* (50 h.p. Fiat SA.8/75 of 1908 ; a number of Anzaldi engines ; one of the SVA biplanes of the 1918 propaganda raid on Vienna), but also several *well-known types from the inter-war years*, such as the Macchi-Castoldi MC. 72 record-breaking aircraft, the latter's Fiat AS. 6 3060 h.p. tandem engine, and the first reaction aircraft, the Caproni-Campini, with piston engine, compressor and afterburner. Above all, however, there were production models and prototypes from the present-day Italian industry, including sporting and touring aircraft, amphibians, fighters, trainers, and piston engines, turbojets and a good selection of equipment items.

During his opening tour Vice-Premier Piccioni (right), visited INTERAVIA's stand and was welcomed by our representative Giorgio Lourier (centre). Left, General A. Urbani, Chief of the Air Staff.

The Fiat G. 59-B two-seater fighter conversion trainer (engine : 1400 h.p. R.-R. "Merlin T 24")

Model of the Fiat G. 49-2 basic trainer (engine : 600 h.p. P. & W. " Wasp "), the prototype of which recently made its first flight.



A series of Fiat G. 46 two-seater trainers for the Italian Air Force (engine : 225 h.p. Alfa 115ter).

The *Air Department of the Italian Ministry of Defence* made a particularly comprehensive contribution to the Show. In addition to the original SVA and Caproni-Campini aircraft, sundry self-propelled maintenance vehicles, fire extinguisher, fuel and repair trucks, ambulances and a British-Italian search radar unit (all shown on the airport), it took up almost one fifth of the large new hangar at Forlanini Airport (Linate, Milan). Here radio and traffic control equipment (including a VOR station), training equip-

Aeronautica Macchi showed the MC. 205 single-seater fighter of World War II (left foreground) and the MB. 320 twin-engined touring aircraft (right, with the markings of one of the British Crown Colonies). Other exhibits included floats from the MC. 72 racer, the MB. 308 sports two-seater, the M. 416 " Instructor " three-seater trainer (Fokker licence) ; D.H. 100 " Vampire " jet fighter (de Havilland licence).

ment for instrument flying (e.g. the wingless Link Trainer C-8), meteorological and aeromedical equipment, various firearms from World War II and complete tail posts, torpedoes, rocket projectiles and finally cutaway models of the Junkers 004 (with axial-flow compressor) and de Havilland " Ghost " turbojets (with radial compressor) were to be seen.

Fiat showed the modern *G.46** (elementary and basic military trainer) and *G.59** (conversion and fighter trainer) in the original version. The new 605 h.p. *G.49* trainer * (basic and conversion training), the prototype of which took off on its first flight in Turin at the end of September, was shown in model form, as was also the *G.80** jet trainer (conversion and fighter training).

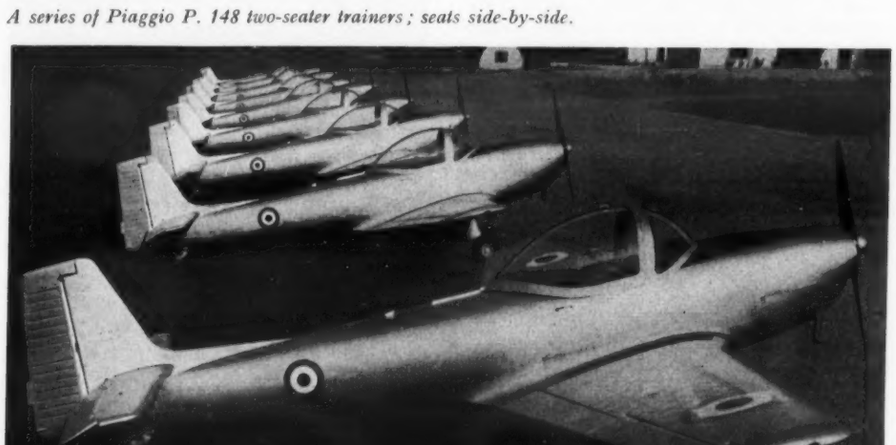
Fiat aircraft engine section (Lingotto) exhibited a number of interesting engines. These representatives of a 44-year history (in which period 46 engine types have been produced) included the SA. 8/75, the first of Fiat's aircraft engines (50 h.p. ; 1908), the AS. 6 tandem engine (3060 h.p. ; 1934), and finally the " *Fiat-Ghost 48 Mk. 1* " (de Havilland licence ; 5000 lb static thrust)

* For dimensions, weights and performance of these types see *table of trainers* in INTERAVIA, Review of World Aviation, No. 10/1952, pp. 568-569.

Model of the new Piaggio P. 150 two-seater basic trainer (engine : 600 h.p. P. & W. " Wasp ").

Model of the Piaggio P. 149 four-seat touring aircraft (engine : 240 h.p. Lycoming GO-435) derived from the P. 148 trainer.

A series of Piaggio P. 148 two-seater trainers ; seats side-by-side.

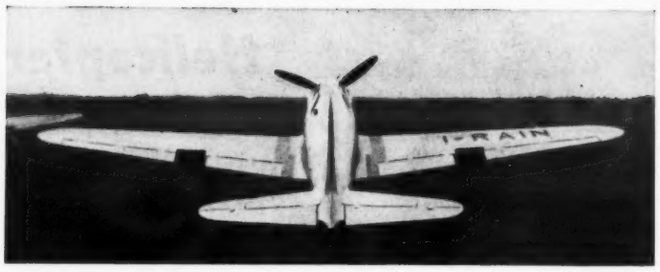


from present-day production. — The propeller section showed its *5006 and 5010 v.p. propellers* (Hamilton Standard licence).

A particularly interesting exhibit was a historical review of Fiat's own designs, in the form of 33 models : first biplane from the pioneer days ; Celestino Rosatelli's CR. 20, CR. 32, CR. 42 fighter biplanes and BR. 20 low-wing monoplane bomber ; Professor Giuseppe Gabrielli's G. 12, G. 18, G. 50, G. 55 . . . to G. 80 all-metal designs. These 33 models however represent only about a quarter of the total number of designs. Altogether Fiat has brought out 124 aircraft types up to the present day.

Aer-Macchi's most striking contribution was the *Macchi-Castoldi MC. 72* racing seaplane of 1934, almost entirely covered with exhaust pipes, in which Italian Air Force officer Agello set up the still unbeaten international speed record for seaplanes (709.2 km/h). The most up-to-date exhibit was the *D.H. 100 " Vampire "* single-seater jet fighter, fresh from quantity production—with original D.H. " Goblin " engine—and the *Macchi-Bazzocchi MB. 320 touring and liaison aircraft.* The latter—a wooden design with two 185 h.p. Continental E. 185 engines, v.p. propellers (SIAI P. 50), retractable nosewheel undercarriage, full instrumentation, VHF and HF R/T, automatic radio compass (Lear), automatic pilot (Sperry) de-icing—has recently found a number of purchasers in East Africa : three MB. 320s have been ordered by *East African Airways*, whose example has been followed by private purchasers in Kenya. It is also being built abroad under licence—the first Italian aircraft since the war—by Société Française de Constructions Aéronautiques Lignel. The aircraft shown came from SFCA production.

Data for the MB.320 : Span 42 ft. 8 in., length 28 ft. 5 in., height 10 ft. 6 in., wing area 229 sq. ft., weight equipped 3285 lbs, load 1675 lbs, gross weight 4960 lbs, maximum speed 200 m.p.h., cruising speed (at 70 % METO) 180 m.p.h., minimum speed 108 m.p.h., service ceiling 17,000 ft. (on one engine, 8,700 ft.), sea level take-off



All-wood SAI-Ambrosini "Supersette" two-seater military trainer (engine : 350 h.p. D.H. "Gipsy Queen 70"). The one-piece wing has diving brakes (between ailerons and flaps).

run to cover 50 ft., 440 yds., maximum range 1000 miles.

A MC.205 single-seater fighter (1943), a *MB.308 sports two-seater* (1946) and the *M.416 "Instructor" (S.11) three-seater trainer* built under licence from Fokker (1952) were also on show.

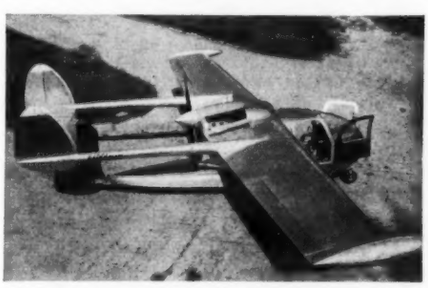
Piaggio & Co. showed the well-known 3 to 5 seater *P.136 all-metal amphibian* (engines : two 215 h.p. Franklin 6A8s or 240 h.p. Lycoming GO-435s), which is used in several versions by the Italian sea rescue service, Customs, police, and the *P.148 two-seater trainer* * (engine : 190 h.p. Lycoming 0-435). Models were also to be seen of the P. 149 four-seater (engine: 240 h.p. Lycoming GO-435) and the *new 605 h.p. P.150 trainer*. Data for the latter: all-metal structure; span 42 ft. 4 in., length 30 ft. 4 in., wing area 271 sq. ft., weight equipped 4320 lbs, load 1280 lbs, gross weight 5600 lbs, maximum speed 236 m.p.h., minimum speed 65 m.p.h., absolute ceiling 23,000 ft., range 880 miles.

SAI-Ing. A. Ambrosini & Co. was represented by its "*Grifo*", "*Trasimenus*" and "*Rondone*" sports and training aircraft, and by the latest version of the S.7 racer, the "*Supersette*" *military two-seater trainer* (engine 350 h.p. D.H. "Gipsy Queen 70"). This type *—a wooden design with one-piece wing and horizontal tailplane—is extremely robust, though light (weight equipped only 3020 lbs), and has high aerodynamic qualities (maximum speed 267 m.p.h.). It can carry a load of 1270 lbs, including two pilots, a machine gun (7.7 mm SAFAT), ammunition and reflector sight (S. Giorgio), a camera gun, two 100-lb bombs and two 31-lb bombs, four 5 cm practice rockets with guide rails, and finally radio and oxygen equipment, a camera (F.24) and 48.5 Imp. gals. of fuel. Other interesting particulars of the "Super-7": orange-peel engine cowlings, diving brakes between ailerons and landing flaps.—Contrary to expectations, no details have yet been released of the newest version of this type, the "Sagittario", with Turboméca "Marboré" turbojet and 45° swept wing.

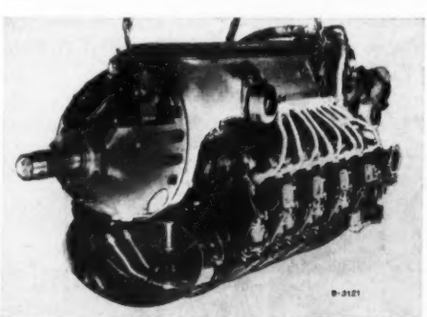
Fratelli Nardi exhibited their brand-new *FN.333 three-seat lilliput amphibian*, a carefully designed all-metal structure with retractable nosewheel undercarriage, flaps and retractable wing-tip floats. The type has extremely small wings and floats and a low

The "Super-7's" training weapons : two 100-lb bombs, two 31-lb bombs, four 5-cm rockets, also a 7.7-mm machine gun, camera gun and reflector sight.

Orange-peel engine cowling in the "Super-7".



Fratelli Nardi showed its new FN. 333 three-seat small amphibian to the public for the first time.



A new version of the Alfa 121 RC air-cooled eight-cylinder Vee engine, which delivers a take-off power of 400 h.p.

weight (weight equipped 1290 lbs). At present a 145 h.p. engine (Continental) is fitted, but this is later to be replaced by a 225 h.p. Continental. The higher-powered version is to be designated *FN.333-S* and to have a folding wing. All controls (undercarriage, wing-tip floats, flaps) are hydraulic. First flight and flotation tests are to take place shortly.

Alfa Romeo had a new version of the *Alfa 121 eight-cylinder Vee engine* (developed two years ago) to offer. This delivers a take-off power of 400 h.p. to a v.p. propeller (SIAI-Marchetti) The well-known *Alfa 110ter* (150 h.p.) and *115ter* (225 h.p.) in-line engines and the *135 RC-32 eighteen-cylinder two-row radial* (1640 h.p. at 2400 r.p.m.) from the war years were also shown.

*

The French firm of *Turboméca* showed one of its small turbojets. With the Swiss instrument firm of *Peravia S. A.*, a German parachute and rescue equipment firm *(Bruggemann & Brand K.G.)* and the American helicopter producers, *Sikorsky Division* (United Aircraft), *Hiller* and *Bell*, represented by equipment supplied to Italy (and by their Italian agents), they were the only foreign exhibitors.

Finally the *Italian accessories industry* was present in force. Aircraft instruments, automatic pilots, oxygen equipment, test equipment, partly of Italian design, partly built under licence, were shown by *Filotecnica Salmoiraghi*; starters, generators, electrical and electronic equipment, radio sets etc. by *Magneti Marelli*; hydraulic equipment for undercarriages and propellers and pressurization equipment by *Magnaghi Oleodinamica*; complete undercarriages and parts by *Fratelli Nardi*; tyres and other rubber parts by *Pirelli*; safety equipment by *Aerostatica*.—Plastics (and plexiglas) were shown by *Montecatini*, *Plexiglas S. A.* and *Vetrocoke*, etc.

*

In spite of the small number of foreign participants, the *Mostra dell'Aeronautica* continued the traditions of the pre-war Milan air shows. The exhibition, under the *patronage of President of the Italian Republic, Professor Luigi Einaudi*, also demonstrated clearly that Italian aviation has arisen from its ashes and is returning to its old place.

Helicopter Terminals

By GÜNTHER KÜHNE, Berlin

There is no doubt that the helicopter will one day become a regular means of transport. It has already got over its teething troubles and proved its technical and economic capabilities, as results obtained in the United States, Britain and Scandinavia have shown.[1]

Of greatest interest to Western European circles are the British experiments, which correspond most closely to Continental European conditions. In size, population and distribution of large towns Great Britain roughly resembles Western Germany.

Germany, of course, has been shut off from all aviation development since the war, yet has one piece of good fortune, strangely enough due to the widespread destruction of her towns. The war has left gaps here which it will take a long time to fill, but which, on the other hand, give progressive town planners the opportunity for some far-sighted planning. Not all the open spaces have yet been " built up ", and there is still time to put in a word for aviation, especially for the helicopter, when German towns are being rebuilt. In a very few years the industry will be able to supply technically and economically sound helicopters, and there will no longer be any obstacles to regular helicopter services—provided the necessary landing grounds are available.

[1] Cf. *Interavia, Review of World Aviation, No. 3/1951*, and *First Report of the Interdepartmental Helicopter Committee*, H.M. Stationery Office, London, 1951.

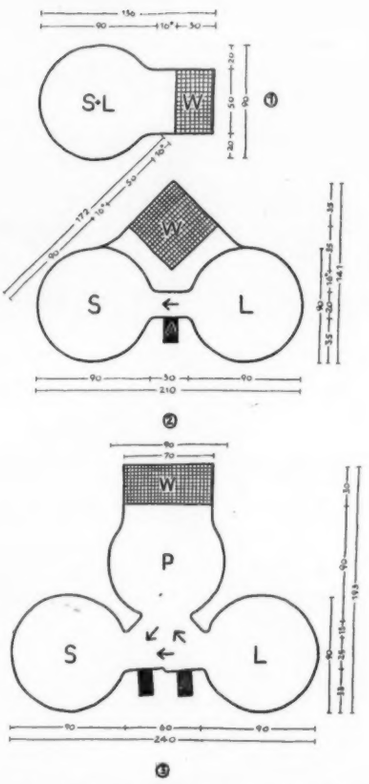


Fig. 2 : Stages of development of a heliport : 1 – for light traffic ; 2 – for medium traffic ; 3 – for heavy traffic ; A – passenger and freight handling ; L – landing ; P – parking ; S – take-off ; W – maintenance.

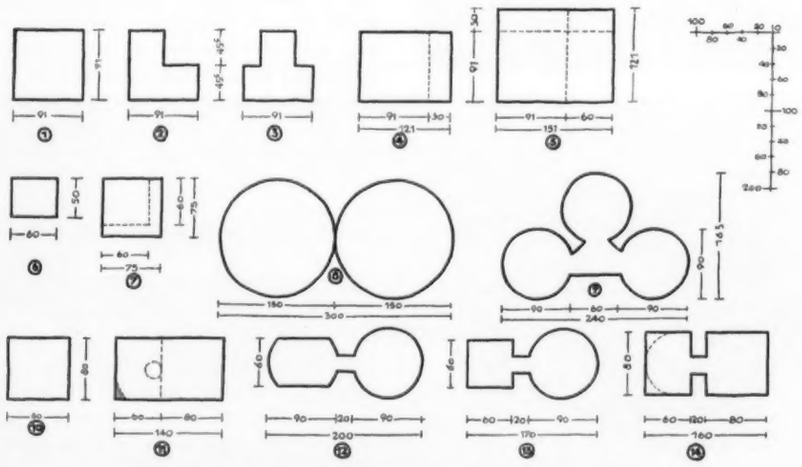


Fig. 1 : Basis designs for helicopter terminals : 1 to 5 – from the " First Report of the Interdepartmental Helicopter Committee " ; 6 – Hamburg project ; 7 – Ch. Froesch's proposal ; 8 – F. Forbat and H. Egler's proposal ; 9 – author's design ; 10 to 14 – Dr. Treibel's proposal.

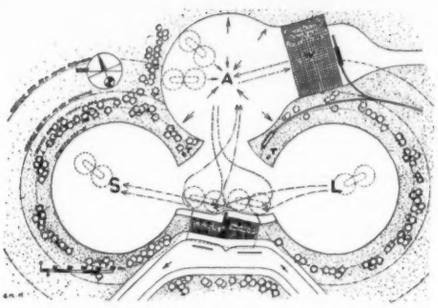


Fig. 3 : Large helicopter terminal (author's design) : A – parking ; K – control tower ; L – landing ; S – take-off ; T – fuelling ; W – maintenance (inset, outline of the Bristol 173 twin-rotor helicopter).

British experiments have shown that a commercial helicopter for about 20 passengers is an economic proposition. Helicopters of this category can be available in quantity in four or five years' time—if there is no war ; prototypes are already flying.

Because of their relatively low cruising speeds (80 to 110 m.p.h.) helicopters can only form a useful supplement to ground transport and fixed-wing aircraft if their landing grounds are located right in the town, so that no time is wasted in getting to and from the airport. In Western Germany in particular it is important to decide how much space is needed for helicopter ground installations, so that the town planners can be given figures to work on.

There is an old but oft-confirmed belief that every new means of transport creates a new traffic demand, so that the older means do not suffer. The existence of extensive, conveniently priced transport services provides an incentive for the public to use them ; new types of services generally win for themselves new territory without eliminating other means of transport. It is therefore quite possible that in the not-too-distant future a large proportion of domestic German air transport may be by helicopter, so that the provision of efficient heliports is of the utmost importance. Here is a vital task for town and country planning, but it does not yet appear to have been fully recognized.

*

Helicopters, too, are subject to the general " laws of growth " for means of transport and will get larger and heavier as time goes on. However, they will probably also have certain economic limits, such as, for example,

have been reached today for fixed-wing commercial aircraft. It may be assumed for the purpose of this article that for the next ten or fifteen years this limit will be 20 to 30 passengers, or *8 to 12 tons take-off weight.*

This will show many a fine scheme to have been illusory, including for example the " Hamburg Project " (fig. 1 ; No. 6), which allows for a landing area only 50×60 yards. Dimensions of helicopter bases have grown considerably in recent years. Early in 1951 the American Charles Froesch proposed heliports of from 60 to 75 yds. square (fig. 1 ; No. 7) ; Dr. Treibel (in a lecture to the German Airport Working Group) of 80×80 yds. with variants (fig. 1 ; Nos. 10-14). The British " *First Report* " takes a square of 300-ft. side as basis ; this may have two runways intersecting at right angles (L or T-shaped ; fig. 1, Nos 1-3). These runways should be 150 ft. wide, i.e., half the length.

Such heliports, however, are only big enough to handle one helicopter. If additional space is to be provided for passenger handling and maintenance, the area must be increased to 91×136 yds. or 121×151 yds. (fig. 1, Nos. 4 and 5). This would make them about as big as a medium-sized sports ground. Size, however, should not be exaggerated unnecessarily, as ground is costly in cities, and heliports must be centrally located.

With the kind of heavy traffic to be expected in world traffic centres a *separation of take-off and landing operations* will be unavoidable, for technical reasons. Landing, unloading, loading and take-off must follow one another smoothly, without unnecessary taxiing, turning, etc. Heavy traffic would also mean that vehicles bringing up passengers, freight and mail must be kept off the taxi surface.

Technical handling includes traffic control on the airfield, in the airfield zone and on neighbouring airways, and mail and freight services. On the subject of *passenger handling*, the proposals made by the British Helicopter Committee even go so far as to suggest that examination of tickets should be done in the actual helicopter, as in trams, buses, etc. It is doubtful whether this is a good idea. We think the helicopter's crew (generally two men) have enough to do already, and it would surely not be too

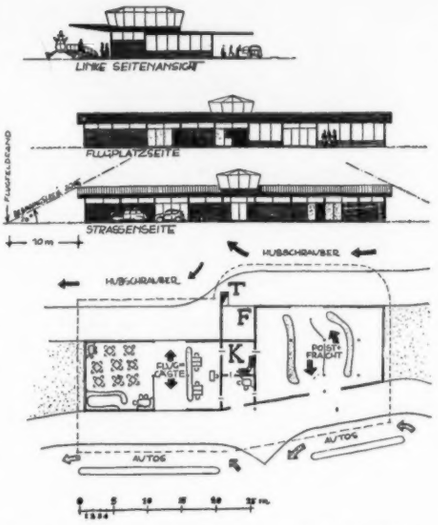


Fig. 4 : Passenger handling and control building of heliport shown in fig. 3. T – fuel point; F – fire service ; K – control tower.

difficult to arrange for ticket inspection at " air stations ", like those at railway stations and at United States domestic airports. In any case helicopters would have to dispense with the excessive luxury which makes European air travel so unnecessarily costly today.

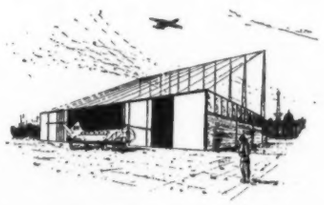


Fig. 5 : Hangar of heliport shown in fig. 3.

The type of two-part helicopter bases proposed by the author (figs. 2 and 3), with separate landing and take-off operations, is also recommended by the Swedish town planners Fred Forbat and Harry Egler, though with larger dimensions (cf. fig. 1, No. 8). Such bases could also make provision for later expansion, as is shown in fig. 2.

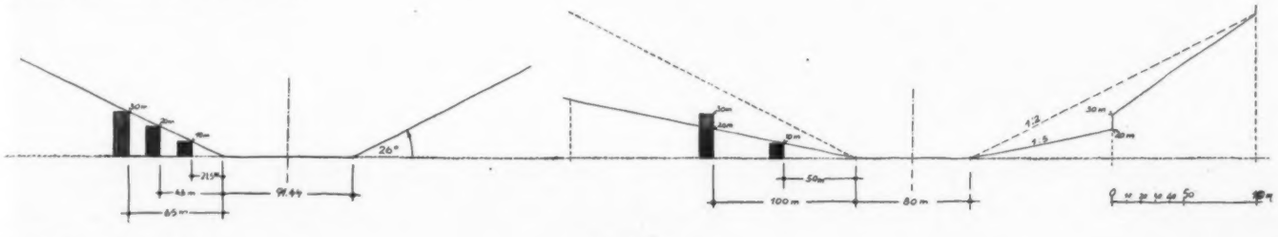
Helicopter stations in towns or other points with heavy traffic will need not only separate landing and take-off areas, separated by ticket offices, etc., but also a special *parking area* where a relatively large number of helicopters can be parked and serviced. There would also have to be room here for hangars, workshops, etc.

The height of all buildings must be restricted so as to form the *obstruction-free angle* explained in greater detail below. In some cases, such as the hangar shown in fig. 5 (design by the author), special structures are needed. As a general rule it can be said that the height of an obstruction may not be more than half its distance from the edge of the airfield.

Even a heliport's surroundings must be as clear as possible. Heavily loaded helicopters no longer land vertically, but at a steep angle. According to the British report the angle for building may be about 26° (fig. 6), in contrast to the obstruction limits of 1 : 50 or 1 : 40 required for large airports. Whether approach and departure lanes to city heliports should be kept entirely free from buildings is another question. In any case it is to be recommended that no residential buildings, schools, hospitals or other buildings whose occupants are particularly sensitive to noise, should be put up in these sectors. The zone adjacent to the heliport in which no buildings should exceed 65 ft. in height should be at least 130 ft. wide. Ideally it should be a *green area* with low trees, though the latter should not grow too quickly. This green belt should also act as a " noise and smell buffer " between the airfield and the surrounding built-up areas, as flying still creates considerable noise and smell nuisance.

In the Utopian " *Cities-of-the-future projects* " which attracted so much attention in the press twenty-five years ago or more, a very popular idea was to build landing surfaces on the flat roofs of large city buildings. With the advent of the helicopter it seemed as if this idea could be put into practice without much difficulty. In actual fact such landing areas would immediately be possible for small helicopters (e.g., Sikorsky S-51, Hiller 360), but not for larger ones. Take-off weights of up to 12 tons and landing areas 90 yds. or more square are far more than any normal building can take. It is not possible to put such a roof surface on a building that is to have normal lighting and ventilation, particularly not on residential or office buildings.

Fig. 6 : Zones to be kept free of building. Left : according to the British Helicopter Committee ; right : according to Dr. Treibel (German Working Committee for Commercial Airports).



Under certain special conditions it would be possible to fall back on roof terminals, which have some obvious advantages ; they are raised above the level of their surroundings by the height of the building, and the angle of the obstruction-free zone can be based at this height. These advantages may, in certain cases, balance the higher construction and maintenance costs (e.g., high price of land in city centres), particularly when a terminal has to be built in a heavily built-up city area.

One of the difficulties experienced with roof terminals is that of fuel storage. To keep fuel inside the building is dangerous, and even if the tanks are outside on the ground there must be at any rate pipes running through the building. Fire prevention authorities would have every right to object to this arrangement. It will therefore be adopted only in exceptional cases, when special protective measures must be taken. *Examples* of roof landing areas are an American project for a bus station with " helicopter connections " (fig. 7), two projected garages (Stockholm and Düsseldorf) and the Hanover central railway station project (fig. 8). The British Helicopter Committee has also worked out an example showing that the cost of

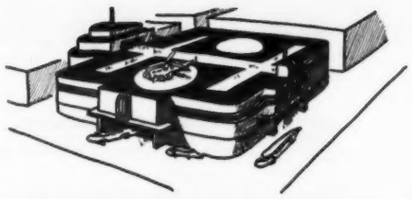
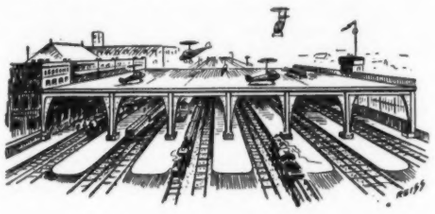


Fig. 7 : Project of an American bus company, Greyhound Lines, for a helicopter terminal combined with a bus station.

constructing a roof heliport on a five-storey steel-and-concrete building (total cost £1,200,000) is about 6.9% of the total, or £83,000. This compares with £37,000 for a ground level terminal. With 22 landings a day (or 8000 a year) the landing charge for roof heliports would be £3, compared with £2 for a ground level heliport, or 50% more.

Fig. 8 : The projected heliport on the roof of Hanover's central railway station is designed primarily for feeder services to Langenhagen Airport, about 6 miles outside the town.



*

It may even be that some day there will be water landing areas, for helicopters. There are already amphibian helicopters for special missions, including a series of twelve-seat Sikorsky S-55s, which are now also to be built in quantity in France. What possibilities this opens to town planners! We should no longer have to rely only on concrete surfaces. Relatively small water surfaces would be sufficient for helicopter take-offs and landings—and this would certainly not spoil the appearance of our cities !

Photo credits :

Front cover : KLM ; pp. 608-610 : Air France ; pp. 610-612 : KLM ; p. 613 : Swissair ; pp. 614-616 : BOAC (7), Interavia (1) ; pp. 617-618 : author (5), ADP (1) ; p. 619 : Willi Klar, Frankfurt-on-Main ; pp. 620-621 : TWA ; pp. 622-624 : factory photos ; p. 624 : RCAF ; pp. 625-626 : British Crown Copyright ; p. 627 : Interavia ; pp. 628-633 : Butler-Green (13), Roland A. Cole (7), Central Press (3), ATP (2), Interavia (3) ; pp. 634-635 : USAF ; pp. 636-638 : G. G. Virchaux (16), ATP (1) ; pp. 639-640 : BEA (1), Air France (1), ATP (1), factory photos (3) ; pp. 641-643 : Italian Ministry of Defence (1), factory photos (2), Interavia records (13) ; pp. 644-646 : author.

INTERAVIA

Subscriptions in the United States from :

Interavia
385 Fifth Avenue
Room 1408
NEW YORK 16, N. Y.

Annual subscription rate : $ 7.00

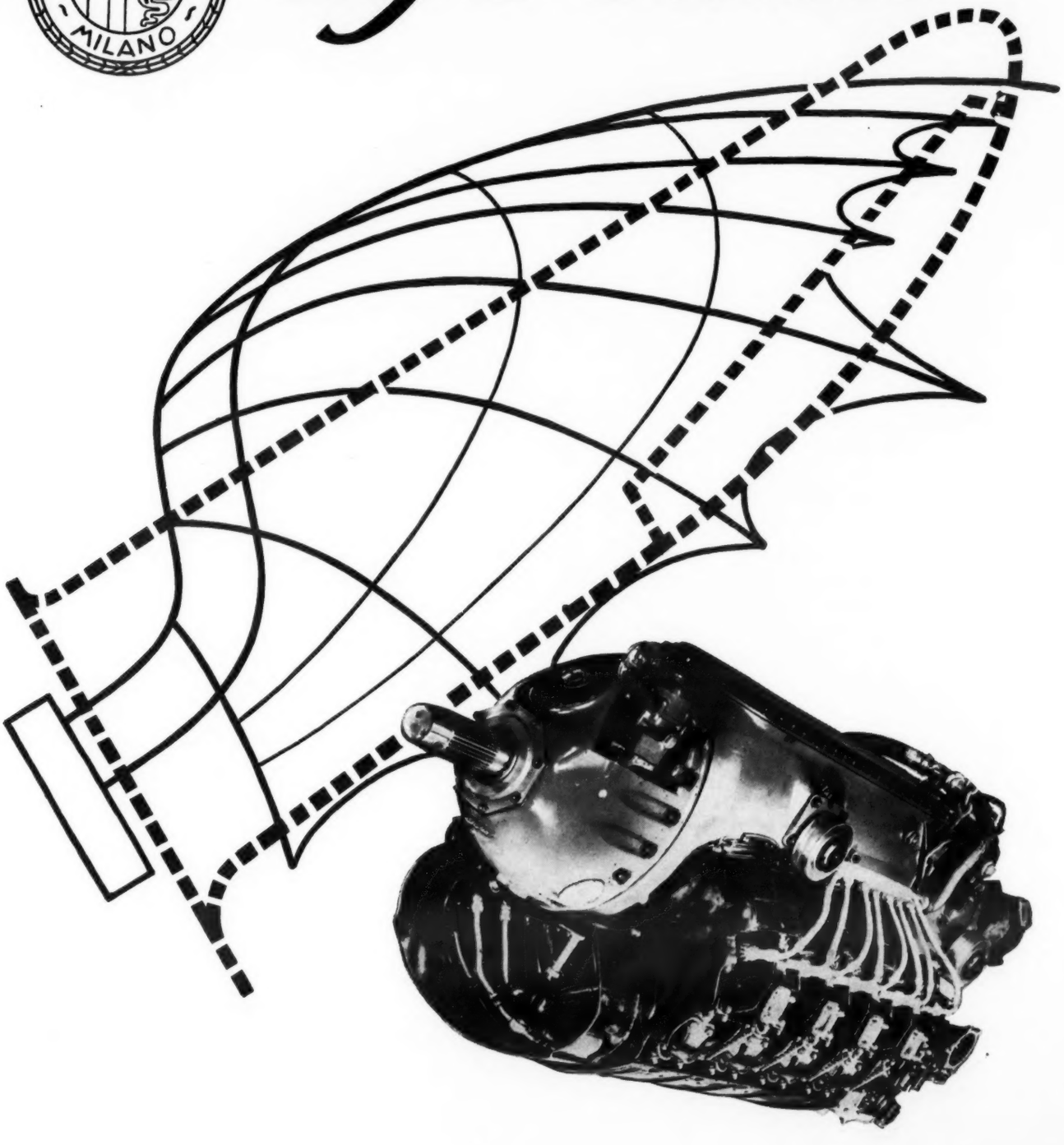
LIAISON — TRAINING — AEROBATICS

POTEZ 6D
240 CV

Société des moteurs HENRI POTEZ — 46, Avenue Kléber — PARIS — KLE 27-83

ALFA ROMEO
MILANO

Alfa Romeo



121 R.C. ENGINE

of all the World's International Airlines*

7 out of 10 use

ESSO

AVIATION PRODUCTS

For spanning oceans and continents — where performance counts the most — international airlines rely on ESSO Aviation Products. Airline operators know they can depend on the high quality of these superior petroleum products.

Uniformity of fuel and lubricant, standardization of service and safe, speedy refueling are essential to modern air carriers. Anticipating these vital needs ESSO aviation marketers pioneered the use of the Hydrant Refueling System and today — even at such widely separated airports as Keflavik (Iceland) and Limatambo (Perú) — ESSO marketers provide the same fast and dependable petroleum service to all aircraft.

Yes, a full range of ESSO Aviation Products is available along the airways of the world — where you want them, when you need them.

ESSO

A GOOD SIGN TO FLY TO

*As listed by: C.A.B. "World Directory of Airlines" and international aviation trade press.